

# HELMINTHOLOGICAL ABSTRACTS

*incorporating*

**BIBLIOGRAPHY OF HELMINTHOLOGY**

COMPILED FROM WORLD LITERATURE OF 1959



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## HELMINTHOLOGICAL ABSTRACTS *incorporating* BIBLIOGRAPHY OF HELMINTHOLOGY

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# HELMINTHOLOGICAL ABSTRACTS

INCORPORATING BIBLIOGRAPHY OF HELMINTHOLOGY

FOR THE YEAR 1959

Vol. 28, Part 1

## 1—Acta Parasitologica Polonica.

- a. KOZICKA, J., 1959.—“Parasites of fishes of Družno Lake. (Parasitofauna of the biocoenosis of Družno Lake—part VIII).” **7** (1/12), 1–72. [Polish summary pp. 68–72.]
- b. DOŻAŃSKA, W. & IWAŃCZUK, I., 1959.—“Wpływ różnych związków chemicznych na żywotność jaj *Ascaris*.” **7** (1/12), 73–94. [English summary pp. 93–94.]
- c. ZDUN, W., 1959.—“Cercariae from *Coretus corneus* (L.) in the environments of Warszawa.” **7** (1/12), 95–115. [Polish summary p. 115.]
- d. SKARBIŁOVICH, T. S., 1959.—“On the structure of systematics of nematodes order Tylenchida Thorne, 1949.” **7** (1/12), 117–132. [Polish summary p. 132.]
- e. KISIELEWSKA, K., 1959.—“A new intermediate host of *Staphylocystis furcata* (Stieda, 1862) Spassky, 1950, and some data on the formation of larvocysts of this tapeworm.” **7** (1/12), 133–142. [Polish summary pp. 141–142.]
- f. CHOWANIEC, W. & DRÓŻDŻ, J., 1959.—“Badania nad biologią i ekologią *Galba truncatula* oraz nad formami larwalnymi *Fasciola hepatica*.” **7** (1/12), 143–160. [English summary pp. 159–160.]
- g. SIEDLECKI, E., 1959.—“Badanie włośnicy bezobjawowej w materiale sekcyjnym zwłok ludzkich.” **7** (1/12), 161–169. [English summary p. 169.]
- h. BEZUBIK, B., 1959.—“Helminthofauna of partridge (*Perdix perdix* L.) in the Lublin Palatinate.” **7** (1/12), 179–188. [Polish summary pp. 187–188.]
- i. FURMAGA, S., 1959.—“Internal parasites of the mole (*Talpa europaea* L.) in the Lublin environment.” **7** (1/12), 203–214. [Polish summary p. 204.]

(1a) Twenty-two species of fishes were examined from Družno Lake and found to be parasitized by Protozoa, helminths, Hirudinea, molluscs and Crustacea. The helminths included the monogenetic trematodes *Diplozoon paradoxum*, *Tetraonchus monenteron*, *Ancyrocephalus paradoxus* and several species [unnamed] of the genus *Dactylogyrus*. Eleven species of Digenea were found, viz., *Bucephalus polymorphus*, *Rhipidocotyle illense*, *Allocreadium isoporum*, *Bunodera luciopercae*, *Sphaerostomum globioporum*, *S. braelae*, *Asymphyllodora tincae*, *A. markewitschi*, *Azygia lucii*, *Phyllodistomum folium* and *Sanguinicola armata*. Six species of adult cestodes were collected, viz., *Caryophyllaeus laticeps*, *Caryophyllaeides fennica*, *Monobothrium wagneri*, *Triaenophorus nodulosus*, *Eubothrium rugosum*, *Proteocephalus percae* and *P. filicollis* as well as juvenile forms of the Proteocephalidae, plerocercoids of *Diphyllbothrium latum*, *Diphyllbothrium* sp. and *Ligula intestinalis*, and cysticerci of *Gryporhynchus* sp. Four species of nematodes were found, viz., *Raphidascaris acus*, *Camallanus lacustris*, *Philometra opercularis* and (?) *Desmidocercella numidica*. The acanthocephala included *Acanthocephalus lucii*, *A. anguillae*, *Neoechinorhynchus rutili* and immature specimens of *Corynosoma strumosum*. Among other parasitic forms encountered may be mentioned the leech *Piscicola geometra*. Kozicka describes *Bucephalus polymorphus* and *Rhipidocotyle illense*, pointing out the frequent confusion that has occurred between the two forms. Descriptions are also given of *Sphaerostomum globioporum*, *S. braelae*, *Asymphyllodora markewitschi*, *Azygia lucii* and short notes made on most of the remaining species. I.L.O.

(1b) Dożańska & Iwańczuk have examined the effect of about 33 chemicals on fertile eggs of *Ascaris lumbricoides*. The eggs were placed in the solutions at 26°C. for given periods and then transferred to Barbagall's liquid for viability tests. The following compounds showed the greatest efficacy: acids (sulphuric, nitric, acetic, hydrochloric) at dilutions over 10%



(they are not applicable in practice, however, due to technical difficulties and harmfulness), iodine, tincture of iodine, phenol and lysol (which are easily obtainable) and also chloroform concentrated alcohols, sulphuric ether, acetone and compounds causing exothermic reactions, e.g. lime and commercial calcium chloride. Bases, salts of heavy metals, insecticides and others proved ineffective. The tabulated results are compared with those of other authors. G.I.P.

(1c) Zdun discusses the occurrence of nine species of cercaria and three species of metacercaria found in collections of *Coretus corneus* which had been taken from six different fresh-water habitats near Warsaw. The species recorded were: a monostome—*Cercaria ephemera* Nitzsch; an echinostome—*C. spinifera* La Valetta; two xiphidiocercariae—*C. pilosa* n.sp. and *C. pseudogracilis* nom.nov. (for *C. gracilis* Wesenberg-Lund); five furcocercariae—cercariae of *Bilharziella polonica* Kowalewski and of *Cotylurus cornutus* Rudolphi, *Cercaria linearis* Wesenberg-Lund, cercaria of *Tyodelphys excavata* (Rudolphi) and *C. vilanoviensis* n.sp.; three metacercariae—*Echinostomum* sp., a species of xiphidiometacercaria and a tetra-cotyle larva of *Cotylurus cornutus*; *Cercaria pilosa* resembles *C. prima* Sinitsin but differs from it in body measurements. The affinities of *C. vilanoviensis* are not discussed. P.K.

(1d) Skarbilovich modifies the classification of the Tylenchida as follows: suborder Heteroderata Skarbilovich, 1957 containing Heteroderidae Skarbilovich, 1947 embracing 5 subfamilies: Heteroderinae Filipev, 1934 with *Heterodera* Schmidt, 1871 subgenus (*Heterodera*) n.subg.—females lemon-shaped to pyriform with a posterior protrusion, eggs deposited in an egg mass, male spicules ending in one or more denticles—*H. (H.) schachtii*, *H. (H.) göttingiana*, *H. (H.) avenae*, *H. (H.) humuli*, *H. (H.) cacti*, *H. (H.) cruciferae*, *H. (H.) schachtii* var. *trifolii*, *H. (H.) weissi*, *H. (H.) galeopsidis*, *H. (H.) carotae*, *H. (H.) glycines* and *H. (H.) fici*; [*H. (H.) schachtii* var. *trifolii* is attributed to Flik & Saaltink, 1949 not Goffart, 1932]; subgenus (*Globodera*) n.subg.—females spherical without posterior protrusion, eggs retained in body, male spicules ending in single points—*H. (G.) rostochiensis*, *H. (G.) punctata*, *H. (G.) leptonepia* and *H. (G.) tabacum*; Sphaeronematinae Raski & Sher, 1952 with *Sphaeronema*; Nacobbinae Chitwood & Chitwood, 1950 with *Nacobbus* Thorne & Allen, 1944; Tylenchulinae Skarbilovich, 1947 with *Tylenchulus* Cobb, 1913 and *Rotylenchulus* Linford & Oliveira, 1940; Meloidogyninae n.subf. with *Meloidogyne* Goeldi, 1887, and *Meloidodera* Chitwood, Hannon & Esser, 1956. She further characterizes the Tylenchata Chitwood & Chitwood, 1950 as containing 9 families, viz., (i) Tylenchidae embracing Tylenchinae with *Tylenchus*, *Ditylenchus*, *Anguina*, *Psilenchus*, *Tylenchorhynchus*, *Chitinotylenchus*; Pratylenchinae with *Pratylenchus*, *Radopholus*; Hoplolaiminae with *Hoplolaimus*, *Rotylenchus* and *Helicotylenchus*; (ii) Neotylenchidae embracing Neotylenchinae with *Neotylenchus*, *Hexatylus* and *Deladenus*; Nothotylenchinae with *Nothotylenchus*, *Thada*, *Boleodorus*, *Halenchus*; Paurodontinae with *Paurodontus* and *Stictylus*; (iii) Criconematidae embracing Criconematinae with *Criconema* and *Cricone-moides*; Hemicycliophorinae n.subf. with *Hemicycliophora*; Paratylenchinae with *Paratylenchus* and *Cacopaurus*; (iv) Dolichodoridae n.fam. embracing Dolichodorinae with *Dolichodorus* and *Belonolaimus*; (v) Macroposthoniidae n.fam. embracing Macroposthoniinae n.subf. with *Macroposthonia*; (vi) Nemonchidae n.fam. embracing Nemonchinae n.subf. with *Nemonchus*; (vii) Atylenchidae n.fam. embracing Atylenchinae n.subf. with *Atylenchus* and *Eutylenchus*; (viii) Ecphyadophoridae n.fam. embracing Ecphyadophorinae n.subf. with *Ecphyadophora*; (ix) Iotonchidae n.fam. embracing Iotonchinae with *Iotonchus*. [In this review Skarbilovich has overlooked a number of relevant papers and some of the facts on which she bases her classification are incorrect, e.g., that the first moult of *Meloidogyne* is inside the egg whereas that of *Heterodera* occurs after hatching.] J.B.G.

(1e) Kisielewska records the larval stages of *Staphylocystis furcata* (Stieda, 1862), synonym *Hymenolepis furcata* (Stieda, 1862), from two insect intermediate hosts, *Geotrupes stercorosus* Scriba—two specimens of the insect each harboured more than 50 cysticeroids at different stages of development—and *Pterostichus vulgaris* L., harbouring fully-formed larvae. The adult cestode is parasitic in species of insectivores belonging to the genera *Sorex*, *Crocidura* and *Neomys*. The cysticeroid and its development are described (with figures)



and compared with previous records. Kisieleska observes that invagination of the scolex rudiment precedes differentiation of the scolex. There is a brief discussion of intra-specific variation in relation to host species. There are six figures and six references. J.M.

(If) The authors, in laboratory experiments, have confirmed the opinion that *Galba truncatula* is the only snail intermediary of *Fasciola hepatica* in Poland, and have shown that only a few metacercariae can develop in a snail at one time even if large numbers enter, that they can overwinter within the snail and that snails measuring 3 mm. to 4.5 mm. are the most highly infected. *G. truncatula* is very common both in highland and lowland areas of Poland, the most favoured habitats being small stretches of water, little overgrown, with a low water level and a slimy clay bottom. The snail populations first appear in April reaching a peak in July and their highest infections were observed in July and in September. G.I.P.

(Ig) Asymptomatic *Trichinella spiralis* infection was shown by post-mortem examination of the diaphragm and intercostal muscles to have been present in 46 out of 340 persons from the province of Białystok. This infection was somewhat more frequent in women (14.3%) than in men (12.9%) and was absent in children under ten years of age. The findings indicated that a person may become infected repeatedly. G.I.P.

(Ih) Bezubik examined 270 partridges, *Perdix perdix* L., in the region of Lublin, Poland, during the months of September to December in 1956 and 1957. In 1956, 46%, and in 1957, 55% of the hosts examined were infected with helminth parasites. One species of cestode, namely *Hymenolepis cantaniana*, was found in 27% of the hosts, the number of specimens present in the host varying from several to several thousand. Six species of nematodes were found, namely *Heterakis gallinae*, *Ascaridia compar*, *Capillaria caudinflata*, *C. bursata*, *Eucoleus annulatus* and *Syngamus trachea*. Information is given of habitat, incidence and some measurements of these species, together with a brief discussion of some aspects of the biology of hosts and parasites. According to Bezubik, the following are new records from the partridge: *Hymenolepis cantaniana*, *Capillaria bursata* and *Syngamus trachea*. I.C.W.

(Ii) Furmaga found that 32 out of 92 moles, *Talpa europaea* L., examined over several years from the Lublin region of Poland, were infected with helminth parasites. One species of trematode, *Ithyogonimus talpae*, was found in 2.1% of the hosts and one species of cestode, *Staphylocystis bacillaris*, in 4.3% of the hosts. 28% of the hosts were infected with nematodes, four species being found, namely, *Capillaria capillaris*, *C. talpae*, *Spirura talpae* and *Morganiella talpae*. Details of infection and some measurements are given. *C. capillaris* is redescribed and compared with *C. urinicola* Sołtys, 1952; the latter species is regarded by Furmaga as valid. I.C.W.

## 2—Agricultural Chemicals. Baltimore.

- a. SPEARS, J. F., 1959.—“The nematode problem.” 14 (1), 39–41, III.
- b. SPEARS, J. F., 1959.—“The nematode problem. 2.” 14 (2), 36–38.

(2a) The nature and implications of nematodes as agricultural pests are discussed together with a more detailed survey of the importance of the potato-root eelworm in the U.S.A. and methods adopted for its control. H.R.W.

(2b) A review of the efficacy of nematicides in the control of the soya bean cyst nematode, the burrowing nematode (*Radopholus similis*), the potato rot nematode (*Ditylenchus destructor*), and the tobacco cyst nematode (*Heterodera tabacum*) is given. The economic importance of these pests in the U.S.A. is also discussed. H.R.W.

## 3—Agriculture. London.

- a. GIBSON, T. E., 1959.—“Nematodiriasis in sheep.” 66 (3), 126–129.

(3a) Gibson reviews succinctly the known facts relating to infection of sheep with *Nematodirus filicollis* and *N. battus*. Control can be most satisfactorily achieved by grazing



the current year's lamb crop for the first eight or ten weeks only on land which did not carry lambs the previous year. Where this is impracticable, three doses of bephenium embonate (125 mg. per kg. body-weight) given at three-weekly intervals starting at the beginning of May are recommended. J.M.W.

#### 4—Agronomy Journal.

- a. WILCOX, G. E., HOLLIS, J. P., FIELDING, M. J., NEWSOM, L. D. & RUSSEL, D. A., 1959.—“The effect of nematode control on the growth and nutrition of certain agronomic crops.” 51 (1), 17–20.

(4a) The effect of several nematicides on the control of plant-parasitic nematodes, and its effect on crop production was studied over four years on a sandy loam with high nematode infestations. Good control of parasitic nematodes was obtained and yields of maize, cotton and sorghum were increased. It is concluded that the control of the nematodes enabled the plants to develop more vigorous root systems resulting in a larger plant. H.R.W.

#### 5—American Journal of Hygiene.

- a. SADUN, E. H., BUCK, A. A., LEE, B. K., MOON, C. H. & BURKE, J. C., 1959.—“Epidemiologic studies for paragonimiasis and clonorchiasis by the use of intradermal tests.” 69 (1), 68–77.

(5a) A study was carried out in two areas in south Korea, one of which was an island while the other was the costal area around Pusan. Intradermal tests were performed on 2,679 persons aged from one to 60 years and upwards, as follows: (i) using an acid-soluble protein fraction of *Paragonimus westermani*; (ii) using a similar fraction of *Clonorchis sinensis*; (iii) using a buffered saline merthiolate as control. Stool examinations were also carried out and those positive to *Paragonimus* antigen were given clinical, sputum and X-ray examinations in addition. For *P. westermani*, wheals of less than 150 sq.mm. were considered negative and those more than 250 sq.mm. positive. For *C. sinensis* wheals of less than 130 sq.mm. were negative and those more than 200 sq.mm. positive. Some cross reactions were observed but all proven *P. westermani* infections had a positive intradermal reaction, although four proven *C. sinensis* infections were negative. Pooled results for both antigens showed an increase in *P. westermani* reactors up to the 20 to 29 age group, then a tendency to decrease; while for *C. sinensis* there was an increase up to age group 40 to 49. More males than females reacted to one or other antigen. There was no correlation between intensity of infection (as measured by egg counts) and size of wheals, but there was significant correlation between stool results and intradermal tests. The conclusion is that such intradermal tests can be useful in epidemiological investigations. W.K.D.

#### 6—American Journal of the Medical Sciences.

- a. MYERS, E. N., NEGRÓN, R. & PEARLSTEIN, H., 1959.—“Intestinal parasitoses in Puerto Rican preschool children at Philadelphia, Pennsylvania in 1958.” 237 (1), 59–66.

(6a) In recent years an increase has been observed in the frequency with which parasitic infections are being reported in areas of the U.S.A. where large numbers of Puerto Rican families have settled. Myers *et al.* therefore investigated the incidence of these infections and associated factors in 170 Puerto Rican children under six years of age, living in Public Health District No. 6 of Philadelphia. The most common helminth parasite was *Trichuris trichiura* (22.3%). 7.1% were infected with *Ascaris lumbricoides* and 2.4% with *Ancylostoma duodenale*. Neither *Schistosoma mansoni* nor *Strongyloides stercoralis* infection was observed. [The incidence figure for *Enterobius vermicularis* (1.8%) is not significant since anal swab techniques were apparently not employed.] Incidence of intestinal parasitic infections in general increased with age. Some evidence was also found that overcrowded living quarters and poor home sanitation contributed to high incidence of parasitic infection. J.M.W.



## 7—American Journal of Tropical Medicine and Hygiene.

- a. WINKLER, L. R. & WAGNER, E. D., 1959.—“A method of comparing geographically distant snail populations by study of their shell composition.” 8 (1), 13–15.
- b. MALDONADO, J. F., 1959.—“The longevity of the unhatched miracidium of *Schistosoma mansoni* in the tissues of mice.” 8 (1), 16–19.
- c. SCHWABE, C. W., 1959.—“Host-parasite relationships in echinococcosis. I. Observations on the permeability of the hydatid cyst wall.” 8 (1), 20–28.
- d. SCHWABE, C. W., SCHINAZI, L. A. & KILEJIAN, A., 1959.—“Host-parasite relationships in echinococcosis. II. Age resistance to secondary echinococcosis in the white mouse.” 8 (1), 29–36.
- e. NORMAN, L., SADUN, E. H. & ALLAIN, D. S., 1959.—“A bentonite flocculation test for the diagnosis of hydatid disease in man and animals.” 8 (1), 46–50.
- f. KAGAN, I. G., ALLAIN, D. S. & NORMAN, L., 1959.—“An evaluation of the hemagglutination and flocculation tests in the diagnosis of *Echinococcus* disease.” 8 (1), 51–55.
- g. OLIVER-GONZÁLEZ, J. & FERGUSON, F. F., 1959.—“Probable biological control of schistosomiasis mansoni in a Puerto Rican watershed.” 8 (1), 56–59.
- h. KUNTZ, R. E., LAWLESS, D. K. & MALAKATIS, G. M., 1959.—“Intestinal protozoans and helminths in Americans residing in Southern Taiwan (Formosa).” 8 (1), 63–66.
- i. GARABEDIAN, G. A., MATOSSIAN, R. M. & SUIDAN, F. G., 1959.—“A correlative study of immunological tests for the diagnosis of hydatid disease.” 8 (1), 67–71.
- j. AUGUSTINE, D. L., 1959.—“The worm turned—action and reaction.” [Presidential address.] 8 (2, Part 1), 93–99.
- k. DANARAJ, T. J., DA SILVA, L. S. & SCHACHER, J. F., 1959.—“The serological diagnosis of eosinophilic lung (tropical eosinophilia) and its etiological implications.” 8 (2, Part 1), 151–159.
- l. WAGNER, E. D. & WONG CHI, L., 1959.—“Species crossing in *Oncomelania*.” 8 (2, Part 1), 195–198.

(7a) Winkler & Wagner carried out an analysis of the chemical composition of the shells of *Oncomelania nosophora* reared in the laboratory and specimens from Japan. The organic content of the shells of the wild snails was found to be about double that of the laboratory specimens, a fact attributed to the excessive feeding with refined cellulose of the cultured material. The following amino-acids were detected in hydrolysates of the organic shell material: aspartic acid, glutamic acid, serine, glycine, threonine alanine and arginine. Glycine was the predominant component. C.W.

(7b) Tri-(n-dodecyl)-mercapto-s-antimonious acid, reported as killing adult schistosomes quickly but as not affecting the eggs, was injected intraperitoneally on two successive days into mice which had been infected with *Schistosoma mansoni* two months previously. In all 79 mice were used and three were killed on each selected post-treatment day, autopsied and the location of the worms studied. The longevity of the eggs was calculated from the day following the second injection. The drug affected the ovary by the third day following treatment; by the eighth day all the worms had moved to the liver; and after the eleventh day only occasional normal worms were met with. The percentage of dead eggs increased with age of infection but no live eggs were found later than the 33rd post-treatment day, although hatching took place as late as the 26th day. No eggs were found in the faeces after the sixth post-treatment day. Mature miracidia were present at oviposition but, as time passed, degenerative changes occurred similar to those taking place in eggs in faeces until death supervened on or before the 33rd day. Flame cells continued to show activity until the actual death of the miracidium. W.K.D.

(7c) Changes in the weight of small daughter cysts of *Echinococcus granulosus* obtained from bovine lungs and livers from the Beirut abattoir were measured when immersed in solutions of varying tonicity and composition. Water passed easily through the cyst wall in both hypertonic and hypotonic saline at 37°C., less easily at 25°C. A sudden permeability change occurred at 0.25 isotonic concentration sodium chloride and certain other hypotonic solutions, and there was some difference in permeability to differing ion mixtures. Potassium and cyanide ions in hypertonic solutions seemed to cause separation of the germinal from the laminated membrane, and the former was shown not to be adherent to the latter. Acetylcholine, physostigmine and iodoacetate each antagonize the action of potassium and may



exert their metabolic effect through inhibition of sulph-hydryl containing enzymes. It is therefore suggested that an acetylcholine-cholinesterase system influences the permeability of the germinal but not of the laminated membrane. Hyaluronidase may have some effect on the permeability of the laminated membrane. Small molecules and physiologically important ions seem to penetrate both membranes easily. Schwabe suggests (i) that while the germinal membrane is mainly responsible for permeability control and osmo-regulation it is impermeable to certain of its own metabolic products; (ii) that these then accumulate and maintain an osmotic differential with respect to host fluids; and (iii) that the laminated membrane forms as the result of an antigen-antibody reaction between the host fluids and products of the germinal membrane and/or scoleces. The laminated membrane is not living and acts primarily as a filter to retain large molecules. W.K.D.

(7d) 32 white mice were inoculated intraperitoneally with 0.25 ml. of a suspension of *Echinococcus granulosus* scoleces from a hydatid cyst in a human brain. Mice of different age groups were used and individuals killed and autopsied periodically, their peritoneal cavities washed and the contents examined for scoleces or developing cysts. Mice 48 days of age or younger at the time of inoculation were highly susceptible and developed numerous cysts but mice 71 days of age or older were relatively resistant to an initial infection under similar conditions. The few cysts which developed in older mice were often larger than any which developed in the younger forms and the possibility of an ecological crowding effect is therefore suggested. The authors conclude that laboratory infections can easily be established in young mice; and that host resistance seems to depend on the rapid destruction of scoleces by cellular reaction. Sexual maturity may be a factor in the susceptibility or resistance of such hosts to hydatid. W.K.D.

(7e) Bentonite flocculation tests performed on 6,689 human and animal sera collected over a period of three years were compared with complement fixation tests using the same antigens. Several types of antigen were also prepared and compared with a standard pig-hydatid fluid antigen. Most of the tests were performed on Indians living in Utah on five reservations. 413 of the total human specimens were sera sent for diagnosis. 18 of these cases had been proved surgically. Of the 413 sera, 42 were positive by the flocculation test, 20 by complement fixation and 14 by both. Of the 18 proven surgically, all were positive by the flocculation test, seven by complement fixation and seven by both. In 190 patients without any clinical history 160 showed a positive flocculation test, 43 a positive complement fixation test, and 17 were positive to both. In 1,957 animal sera, 69 were flocculation-positive and eight complement fixation positive. Some cross reactions occurred. Norman and her co-workers conclude that a final evaluation of the bentonite flocculation test is not yet possible and that no conclusions can be drawn as to specificity, but the use of this test is justified along with the complement fixation and haemagglutination tests. Antigens made from types B and C scoleces may be more specific and have considerable possibilities. W.K.D.

(7f) The haemagglutination and bentonite flocculation tests for the diagnosis of *Echinococcus* infection were investigated and compared with the complement fixation test. In 23 verified cases the haemagglutination test was positive in all and the bentonite flocculation test in 20. In seven clinically suspected cases the haemagglutination test was positive in six, the bentonite flocculation test in seven and the complement fixation test in three. 124 sera from patients suffering from other diseases (44 of which were due to helminths) gave 14 positive haemagglutinations but no positive bentonite flocculation. The haemagglutination test seems to be more sensitive than either the bentonite flocculation or complement fixation tests, but is to some extent non-specific. Atypical reactions must be therefore recognized if used for diagnosis. Titres of even 1:100 should then be regarded with suspicion. In clinically active cases haemagglutination titres are high. In sera with positive haemagglutination titres of 1:200 or bentonite flocculation titres of 1:5 there is presumptive active disease. W.K.D.

(7g) In Puerto Rico the intermediate host of *Schistosoma mansoni* is *Australorbis glabratus*. In 1947 one area was selected for a schistosomiasis test control project covering treatment



of infected persons, general hygiene and health education measures. From then until 1953 the infection rate dropped from 44% to 4.5% but rose again to 30% in 1953. Sodium pentachlorophenate treatment of snail-infested waters in 1950 was of only temporary value. The South American ampullarid *Marisa cornuarietis* was first seen in the area in 1952 following which *Australorbis* showed a gradual decline till 1956 and infected snails have not been found since. From March 1956 *Marisa* has been introduced in lots of 200 large specimens in streams, swamps and oxbows. By 1957 *S. mansoni* infections were reduced to 7%, infection in the 0-16 year group showed no increase over the 1956 level while those under five years old were all infection-free; thus suggesting that the watershed is now free of infection. This is regarded as the first instance of probable effective biological control of schistosomiasis in the endemic area. [See also Helm. Abs. 26, No. 112c.]

W.K.D.

(7h) 300 stool specimens from 116 military personnel and 184 of their dependants living in South Formosa were examined. The majority were adults 24-25 years old. Hookworms were present in one of the military personnel and one dependant; *Ascaris* in 17 military men and ten dependants; *Heterodera* sp. in one military; *Enterobius* in four military and one dependant; and *Trichuris* in four military and three dependants. 74% of the military personnel and 78% of their dependants had no intestinal parasites. The figures are for one examination only but the over-all incidence is nevertheless higher than in Navy personnel and dependants in the U.S.A.

W.K.D.

(7i) The haemagglutination, complement fixation and intradermal tests for hydatid infection were compared in Beirut on 184 patients, in 79 of whom hydatid disease was confirmed surgically, while the remainder was not suspected of the infection. A stock pooled antigen was used and the intradermal tests read after 20 minutes. In those patients with proved hydatid disease complement fixation was positive in 77.2%, the intradermal test in 88.6% and the haemagglutination test in 87.3%. The corresponding percentages of positive reactors in the group not suspected of hydatid disease were 5.9%, 18.1% and nil. Of ten patients who gave false negatives to the haemagglutination test seven had infected, calcified, or sterile cysts with no scoleces. Hydatid fluid antigen can best be stored when lyophilized; when filtered through a Seitz filter it failed to sensitize tanned red cells. It is concluded that the haemagglutination test seems to be more specific than either the complement fixation or intradermal tests for hydatid infection.

W.K.D.

(7j) In this witty and entertaining address, Augustine traces in scholarly fashion the gradually accelerating changes in man's attitude towards parasitic worms. He lays stress upon the cardinal importance of certain specific additions to helminthological knowledge and their practical outcome in initiating major advances in human medicine as a whole. Thus the early 19th century studies on trichinellosis in Germany ushered in the modern method of epidemiological research, since this was the first epidemic disease for which both cause and transmission were fully known and for which, therefore, sound control measures could be deduced and applied. Similarly, the first endemic disease to be effectively controlled as a result of the discovery of the nature and life-cycle of the aetiological agent was echinococcosis which, between 1863 and 1920, was virtually eradicated from Iceland. The St. Gotthard epidemic of hookworm disease in the late 19th century caused the recognition of this infection as a major public health problem on every continent; and this in turn was a potent force in the introduction, development and extension of public health forces throughout the world, particularly in rural areas. The development of anthelmintic medication and the introduction of parasitology into the curricula of many medical schools were also sequelae of the appreciation of the menace of hookworm disease. More recently has come recognition of the fact that plant-inhabiting nematodes rank among the worst agricultural pests, with consequent expansion in the personnel and facilities devoted to their investigation and control. The helminthological problems which arose during and immediately following the Second World War were responsible not only for a great increase in the volume and tempo of research in this field, but also for directing emphasis to host-parasite relationships, epidemiology and



control. The expansion in Helminthological Abstracts since its inception in 1932 is instanced as a measure of the increase in the magnitude of helminthological research in the last quarter of a century. J.M.W.

(7k) Using a 1% alcoholic extract of dried *Dirofilaria immitis* powder as antigen, Danaraj *et al.* applied the complement fixation test to the sera of 228 persons with hypereosinophilia of 3,000 or more cells per cu.mm., 213 of whom were diagnosed as suffering from eosinophilic lung (tropical eosinophilia). The test was also applied to five control groups, namely, (i) 85 persons with mild eosinophilia of less than 3,000 cells per cu.mm., (ii) 119 cases of human filariasis, (iii) 33 dogs with *D. immitis* infection, (iv) 30 cases of severe ascariasis, (v) 160 normal individuals. A positive reaction, in most cases with a high titre, was obtained in 95.3% of the cases of eosinophilic lung but in only 20.0% of the other hypereosinophiliacs. In the five control groups a positive reaction was obtained in 7.1%, 20.2%, 21.2%, 6.7% and 5.6% respectively, the majority with low titre. After treatment with diethylcarbamazine the titres gradually diminished in all the patients suffering from eosinophilic lung and became negative in 95.4% of those who completed the full observation period of 30 weeks. The authors conclude that (i) the complement fixation test as described can be used to differentiate eosinophilic lung from other conditions associated with eosinophilia; (ii) the test is of proven value in the diagnosis of atypical cases; and (iii) eosinophilic lung may be a manifestation of filariasis, not necessarily human, previously undescribed owing to the absence of microfilaraemia at any stage. J.M.W.

(7l) Wagner & Wong Chi have carried out successful cross breeding experiments between four species of *Oncomelania* (intermediate hosts of *Schistosoma japonicum*), *O. hupensis*, *O. formosana*, *O. quadrasi* and *O. nosophora*. All of the possible combinations were tried and young were produced in all cases including by a mating between a *nosophora* female and a *formosana* × *hupensis* male. The authors suggest that despite the taxonomic implications of their results no changes in the nomenclature of the snails should be made. C.W.

## 8—American Journal of Veterinary Research.

- a. SCHWARTZ, B., 1959.—“Experimental infection of pigs with *Ascaris suum*.” 20 (74), 7-13.
- b. DRUDGE, J. H., LELAND, Jr., S. E., WYANT, Z. N., ELAM, G. W. & HUTZLER, L. B., 1959.—“Critical tests with polymethylenepiperazine (PMP) against parasites of the horse.” 20 (74), 69-74.
- c. TURNER, J. H., 1959.—“Experimental strongyloidiasis in sheep and goats. 1. Single infections.” 20 (74), 102-110.
- d. DOUGLAS, J. R., BAKER, N. F. & LONGHURST, W. M., 1959.—“Further studies on the relationship between particle size and anthelmintic efficiency of phenothiazine.” 20 (74), 201-205.

(8a) Schwartz gave, by stomach tube, on the day of weaning: (i) to three pigs, 56 days old, 7,500 embryonated eggs of *Ascaris suum* cultured in 0.5% formalin for 43 days at room temperature; (ii) to three pigs, 52 days old, 10,000 embryonated eggs cultured in tap-water 83 days earlier; and (iii) to three litter mates of these pigs, in the feed, lungs of nine guinea-pigs containing *Ascaris* larvae obtained by infection of the guinea-pigs a week earlier with 7,500 embryonated eggs. The six pigs of the first two groups (litter mates) harboured, after 51 to 133 days, 27 to 109 adult worms of both sexes, the smallest being found 51 days, the largest nearly four-and-a-half months, after infection. One of the third group of pigs, killed 84 days after infection, harboured 115 adult male and female worms, another, killed 67 days after infection, harboured 204 adult male and female worms; in these two pigs eggs appeared 47 and 51 days after infection. The third pig, 74 days after infection, harboured only one adult female worm. Details of elimination of eggs, larvae and worms before necropsy are given. Schwartz believes that natural elimination of the worms seems to be associated with their final ecdysis, but may also be associated with development of host resistance. He briefly discusses theories of the significance of the early migrations of the larvae and concludes that these have no survival value and may even lead worms into situations from which they cannot escape. The migrations probably indicate evolution of *A. suum* from ancestors with an indirect life-history which has become compressed into a single host. G.L.



(8b) In five horses dosed with polymethylenepiperazine at dose levels of 21, 51 or 106 mg. per lb. body-weight clearance of ascarids was obtained with all dosages. The effect against oxyurids was much less marked and large numbers of immature worms were found at autopsy four days after treatment. About 85% of small strongyles were removed at dosages of 21 mg. per lb. and above and about 50% of *Strongylus vulgaris* were removed at dosages of 51 mg. per lb. and above. The drug was inactive against *S. edentatus*, *Trichostrongylus axei*, *Habronema muscae* and *Strongyloides westeri*. In another eight horses subjected to critical test following dosage at 5 to 13 mg. per lb., 100% efficiency against *Parascaris equorum* was observed in most animals receiving 10 mg. per lb. Efficacy was low and irregular against *Oxyuris equi*. This dose level was also effective against small strongyles when the drug was given by stomach tube but less effective given in feed. Non-critical tests on 21 horses indicated that 40 mg. per lb. was required for significant removal of *Strongylus vulgaris*. All dosage is expressed in terms of piperazine base. O.D.S.

(8c) Turner obtained infective larvae of *Strongyloides papillosus* from charcoal cultures of faeces of lambs previously infected and applied these in water by pipette to the shaved inguinal region of eight lambs and two kids taken from their mothers at birth and maintained parasite-free by methods described. Four lambs and one kid were kept as uninfected controls. The eight lambs were thus given single exposures of 25,000 to one million larvae, the two kids of 100,000 to 300,000 larvae. Eggs of *S. papillosus* appeared in the faeces nine days, and the peak of egg production 15 to 18 days, after exposure to the larvae. Only parasitic female worms were found at necropsy. Non-fatal infections usually ended after seven to eight weeks. Clinical signs of the infection were anorexia, loss or retardation of weight, slight to moderate anaemia, lassitude, difficult respiration, abnormal stools, abnormal thirst and polyuria. The five lambs exposed to 100,000 larvae or more died 13 to 41 days later, the date of death being usually related to the number of larvae used. Tissue damage was usually confined to severe enteritis, with fluid catarrhal exudate and leucocytic infiltration and oedema of the duodenum and jejunum; the adults and larvae did not penetrate beyond the muscularis mucosae. The lungs were affected only during the early stage and were usually normal 13 days after exposure to larvae; pneumonitis and emphysema were found in only one lamb. No direct evidence was obtained that any phase of *S. papillosus* helps the establishment of bacterial infections. The literature is recorded and discussed. G.L.

(8d) Phenothiazine of different particle size was given to lambs with natural worm infections. The animals were grouped in approximately equal order of weight of infection as determined by egg counts. The drug was administered in gelatine capsules or by dosing syringe. The lambs were slaughtered seven days after treatment and total worm collections made from abomasa and small intestines. The data presented suggest that to obtain high efficiency against *Trichostrongylus*, *Ostertagia* and *Nematodirus* the phenothiazine should have an average particle diameter of  $2\mu$  or less with a specific surface area of 25,000 sq. cm. per gm. or higher. It is also suggested, on evidence that requires confirmation, that purified phenothiazine of particle diameter of  $5\mu$  would provide similar efficiency. O.D.S.

### 9—American Midland Naturalist.

- a. CHENG, T. C., 1959.—“Studies on the trematode family Brachycoeliidae, II. Revision of the genera *Glypthelmins* (Stafford, 1900) Stafford, 1905, and *Margeana* Cort, 1919; and the description of *Reynoldstrema* n.gen. (Glypthelminae n.subfam.)” 61 (1), 68–88.

(9a) Cheng revises *Glypthelmins* and considers that only those species which possess peripharyngeal glands should be assigned to this genus. *Margeana* Cort, 1919 is re-established for those species without peripharyngeal glands, with the exception of *G. africana* which is transferred to *Reynoldstrema* n.g. A new subfamily of the Brachycoeliidae, the Glypthelminae, is erected for these three genera. The species of *Glypthelmins* now considered valid are *G. quieta*, *G. subtropica* and *G. festina*. *Margeana* contains 11 species, *M. californiensis*, *M. linguatula* n.comb., *M. repandum* n.comb., *M. parva* n.comb., *M. elegans* n.comb., *M. staffordi* n.comb.,

*M. rugocaudata* n.comb., *M. shastai* n.comb., *M. simulans* n.comb., *M. proximus* n.comb. and *M. sera* n.comb. *G. palmipedis* is a synonym of *M. linguatula*. Descriptions, illustrations and keys to the species are given. *Reynoldstrema* shows great similarity to *Brachycoelium*, *Glypthelmins* and *Margeana* but the posteriorly situated uterus and testes are sufficiently distinctive to justify the erection of a new genus. S.W.

# 10—Annales de Parasitologie Humaine et Comparée.

- a. GOLVAN, Y. J., 1959.—"Le phylum des Acanthocephala. Deuxième note. La classe des Eoacanthocephala (Van Cleave, 1936)." **34** (1/2), 5-52.
- b. ANDERSON, R. C. & CHABAUD, A. G., 1959.—"Remarques sur la classification des Splendofilariinae." **34** (1/2), 53-63.
- c. CHABAUD, A. G. & ANDERSON, R. C., 1959.—"Nouvel essai de classification des filaires (superfamille des Filarioidea) II. 1959." **34** (1/2), 64-87.
- d. CHABAUD, A. G., ANDERSON, R. C. & BRYGOO, E. R., 1959.—"Sept filaires d'oiseaux malgaches." **34** (1/2), 88-109.
- e. GOLVAN, Y. J., 1959.—"Note additionnelle. Description de la microfilarie de *Splendofilaria gretillati*." **34** (1/2), 110-111.

(10a) Golvan presents a revised classification of the class Eoacanthocephala (Van Cleave, 1936) of the Acanthocephala. He divides the class into two orders, namely the Gyracanthocephala (Van Cleave, 1936) and the Neoacanthocephala (Van Cleave, 1936). These groups are defined together with the families, subfamilies, genera, and subgenera recognized by Golvan; the generic diagnoses are accompanied by illustrations and a list of species is given for each genus. The classification of the Eoacanthocephala is discussed and a key for the determination of the genera of this class is given. A host-parasite list for the species of Eoacanthocephala is provided. I.C.W.

(10b) Anderson & Chabaud redescribe *Pseudaproctella nuda* (Hamann, 1940) and review the genera of the nematode subfamily Splendofilariinae in which the anus of the female is not terminal, subterminal or atrophied. A key is given to such genera and some new groupings and combinations are proposed, thus: *Lerouxinema* Singh, 1949, with one species; *Splendofilaria* Skryabin, 1923 (= *Chandlerella*, *Vagrifilaria*, ?*Skrjabinocta*, ?*Ularofilaria*, *Parachandlerella*), with 13 species of which two are new combinations, ?*S. papillocerca* (Lyubimov, 1946) and ?*S. petrowi* (Chertkova, 1946); *Paraprocta* Maplestone, 1931, with one species; *Aproctella* Cram, 1931 (= *Carinema*), with three species; *Ornithofilaria* Gönnert, 1937, with ten species of which one is a new combination, ?*O. skrjabini* (Petrov & Chertkova, 1947); and *Pseudaproctella* Anderson, 1956 (?synonym of *Cardiofilaria* Strom, 1937), with six species of which three represent new combinations, *P. graucalinum* (Johnston & Mawson, 1940), *P. inornata* (Anderson, 1956) and *P. ardae* (Mawson, 1957). *Cardiofilaria pavlovskyi* Strom, 1937 is listed under the same genus as a doubtful member. The genus *Pseudaproctella* is mainly characterized by the large size of the microfilaria and the genus *Paramicipsella* Chow, 1939 is suppressed and the three species it contained, *P. brevicaudata* Chow, 1939, *P. lepidogrammi* (Tubangui & Masilungan, 1937) and *P. australis* (Johnston & Mawson, 1942) referred to the genus *Aprocta*. W.G.I.

(10c) Chabaud & Anderson present a new classification of the superfamily Filarioidea (Nematoda) in the form of a dichotomous key. The genus *Cardionema* Yamaguti, 1941 and the sub-family Cardionematinae are referred to the Metastrongylidae, as is *Neurofilaria* Whitlock, 1952. The family Desmidocercidae is included among the Filarioidea. The superfamily is divided into five families, fifteen subfamilies and 76 genera, thus: Desmidocercidae: *Desmidocerca*, *Diomedinema*, *Desmidocercella* (= *Pharyngosetaria*); Diplotriaenidae: *Diplotriaeninae*: *Quadriplotriaena*, *Diplotriaena* (= *Diplotriaenoides*); Dicheilonematinae: *Monopetalonema* (= *Politospiculum*=*Ornithosetaria*), *Dicheilonema* (= *Contortospiculum*), *Serratospiculum*, *Heterospiculum*, *Hastospiculum* (= *Setarospiculum*), *Hamatospiculum* (= *Parhamatospiculum*). Filariidae: *Aproctinae*: *Pseudaprocta* (= *Buckleyfilaria*), *Aprocta* (= *Lissonema*=*Paramicipsella*=*Cerebrofilaria*), *Mawsonfilaria*, *Squamofilaria* (= *Coronofilaria*=*Austrofilaria*). Filariinae: *Parafilaria*, *Suifilaria*, *Filaria* (= *Hyracofilaria*). Setariidae: *Stephanofilariinae*: *Pseudofilaria* (= *Proto-*



*filaria*), *Stephanofilaria*. Setariinae: *Skrjabinofilaria* (= *Cortiamosoides*), *Setaria*, *Skrjabinaria*, *Papillosetaria*. Onchocercidae (nom. nov. for Dipetalonematidae) (Leiper, 1911 subfamily): Oswaldofilariinae: *Conispiculum*, *Piratuba*, *Oswaldofilaria*. Icosiellinae: *Icosiella*. Dirofiliariinae: *Bostrichodera*, *Dirofilariaeformia*, *Skrjabinodera* (= *Gazellofilaria*), *Tawila*, *Loa* (= *Paraloea*), *Foleyella* (= *Foleyellides*), *Pelecitus* (= *Spirofilaria* = *Eulimdana*), *Dirofilaria*. Onchocercinae: *Ochoterenella*, *Saurofilaria*, *Macdonaldius*, *Parlitomosa*, *Pseudolitomosa*, *Litomosoides* (= *Vestibulosestaria* = *Finlayinema*), *Litomosa*, *Migonella*, *Wuchereria*, *Ackertia*, *Dipetalonema* (= *Acanthocheilonema* = *Tetrapetalonema* = *Loxodontofilaria* = *Molinema* = *Monnigofilaria*), *Breinlia*, *Deraio-phoronema*, *Gardophilus*, *Alcefilaria*, *Elaeophora*, *Wehrdickmansia* (= *Acanthospiculum*), *Onchocerca*. Splendidofilariinae: *Thamugadia*, *Lerouxinema*, *Splendidofilaria* (= *Chandlerella* = *Vagrifilaria* = *Parachandlerella* = ? *Skrjabinoceta* = ? *Ularofilaria*), *Micipsella* (= *Cercofilaria*), *Onchocercella* (= *Grammophora* = *Katanga*), *Johnstonema*. Ornithofilariinae n. subf.: *Cardianema*, *Pseudothamugadia*, *Anenteronema*, *Aproctella* (= *Carinema*), *Paraprocta*, *Paronchocerca* (= *Houdemerus*), *Aproctoides* (= *Wymania*), *Striatofilaria*, *Ornithofilaria* (= *Lophortofilaria*), *Pseudaproctella*, *Protofilaria*. Lemdaninae: *Lemdana*. Eufilariinae: *Saurositus*, *Aproctiana*, *Sarconema*, *Eufilaria*. W.G.I.

(10d) Chabaud, Anderson & Brygoo describe seven species of filariids from birds from Madagascar. *Diplotriaena monticelliana* (Stossich, 1890) from *Ixocincla madagascariensis*; *Diplotriaena* sp. from *Falco newtoni*; *Aprocta papillosa* n.sp. from *Centropus toulou*; *A. caprimulgi* (Kazubski, 1958) *madagascariensis* n.var. from *Caprimulgus madagascariensis* and *A. fiorii* n.sp. from the same host; *Aproctella milloti* n.sp. from *Pterocles personatus*; *Splendidofilaria gretillati* n.sp. from *Agapornis cana*. *Diplotriaena* sp. is very similar to *D. falconis* (Connal, 1912), differing from it by more pointed tridents. *Aprocta papillosa* is similar to *A. rotundata* (Linstow, 1903), differing in having bosses. *A. c.* var. *madagascariensis* is provisionally distinguished because of some slight differences in dimensions. *A. fiorii* differs from *A. nyctidromi* Caballero & Peregrina, 1938 in measurements and the arrangement of the caudal papillae. *A. milloti* is almost identical with *A. carinii* (Pereira & Vaz, 1933), differing in the form of the spicules. *S. gretillati* is distinct in the oesophagus not being in two parts and in not having an ornamented cuticle. The genera *Lissonema* Linstow, 1903 and *Cerebrofilaria* Kazubski, 1958 are considered synonymous with *Aprocta* Linstow, 1883. W.G.I.

(10e) Golvan describes the microfilariiae of *Splendidofilaria gretillati* Chabaud, Anderson & Brygoo, 1959 as being regularly curved without secondary undulations and as having a rounded head end and a relatively short and obtuse tail. He says in a foot-note that what he previously described in microfilariiae as "cellules génitales" should more correctly be called "cellules rectales". W.G.I.

## 11—Annales de la Société Belge de Médecine Tropicale.

- a. LINARD, R., 1959.—"L'éléphantiasis de la verge. Sa cure opératoire." 39 (1), 95–100. [English, German, Spanish & Flemish summaries pp. 99–100.]

(11a) Linard describes a technique of replacement of the penile sheath in surgical treatment of elephantiasis. It consists in taking a pedicle skin graft from the top of either thigh. The operation, which is relatively simple, is carried out in three stages. N.J.

## 12—Annals of Applied Biology.

- a. WALLACE, H. R., 1959.—"Movement of eelworms. IV. The influence of water percolation." 47 (1), 131–139.  
b. FENWICK, D. W. & WIDDOWSON, E., 1959.—"The emergence of larvae from free eggs of the potato-root eelworm *Heterodera rostochiensis* (Woll.)." 47 (1), 140–149.

(12a) The relationship between rate of flow of water through sands of different particle size and the downward velocity of eelworms of various lengths and activities is described. An equation is developed relating these factors for flow rates over 500 cm. per hour. With such rates of flow, the velocity approaches zero when the eelworms' length exceeds four times



the pore diameter. Velocity increases as pore diameter increases, but at slow flow rates the eelworms pass through smaller pores. Dead or inactive eelworms are not carried through sand even at high flow rates. H.R.W.

(12b) The authors describe a method of hatching eggs of the potato-root eelworm, after these eggs have been freed from within the eelworm cyst. The hatching rate of "free" eggs is slightly higher than that of eggs enclosed in cysts, but the pattern of hatching of free and enclosed eggs is similar. It is necessary to pre-soak cysts before extracting eggs from them; eggs taken from dry cysts or from cysts which have been cracked open before soaking do not respond to the hatching stimulus of potato-root diffusate. When free eggs or whole cysts are used in the bioassay of potato-root diffusate, the values obtained for the activity of the hatching factor are in close agreement. By using "free" eggs in hatching tests it is possible to predict and control the accuracy of the test, and replication can be minimized. J.J.H.

### 13—Annals of Tropical Medicine and Parasitology.

- a. FRIEDHEIM, E. A. H., 1959.—"Some approaches to the development of chemotherapeutic compounds." **53** (1), 1-9.
- b. CROSSKEY, R. W. & CROSSKEY, M. E., 1959.—"A quantitative survey of onchocerciasis in persons under twenty years of age in an endemic area of Northern Nigeria. With a consideration of the epidemiology based on a mathematical hypothesis, by F. N. Macnamara." **53** (1), 10-24.
- c. GIBSON, T. E., 1959.—"The identification of *Cysticercus bovis*, with special reference to degenerate cysticerci." **53** (1), 25-26.
- d. JORDAN, P., 1959.—"The possible rôle of low-density microfilaraemia in the spread of *Wuchereria bancrofti* by *Culex fatigans* in East Africa." **53** (1), 42-46.
- e. KIRK, R., MORGAN, H. V., HASEEB, M. A. & SATTI, M. H., 1959.—"Onchocerciasis in the Sudan Republic." **53** (1), 97-102.
- f. EDESON, J. F. B. & BUCKLEY, J. J. C., 1959.—"Studies on filariasis in Malaya: on the migration and rate of growth of *Wuchereria malayi* in experimentally infected cats." **53** (1), 113-119.

(13a) Having defined chemotherapy as the causal therapy of communicable diseases, aimed at electively destroying the pathogenic agent with synthetic poisons without jeopardizing the host, Friedheim continues to discuss the activity pathways of such poisons through inactivation of biochemical systems. The development of chemotherapeutic agents must be through work on the differential sensitivities of host and parasite to these substances. It is considered that the approach to such development is simpler when the action groups of such agents consist of metaloids and metals than when the agent is entirely organic. This theory is pursued by presentation of examples in the field of arsenicals used in the treatment of sleeping sickness where modification of the arsenic carrier resulted in the development of melarsen, melarsen oxide and "Mel B". Here, the biochemical thought was directed to the development of well tolerated substances which retained chemotherapeutic activity. The same principles were applied to the development of antimonials for use in the treatment of schistosomiasis and the example quoted is antimony dimercaptosuccinate (TWSb). In this compound the dissociation of antimony salts is reduced by substitution of hydroxyl groups, as in tartar emetic, by sulphur. It is claimed that this sulphur analogue of tartar emetic is 50 times less toxic than tartar emetic itself but retains its efficacy. O.D.S.

(13b) Crosskey & Crosskey discuss the quantitative survey of onchocerciasis in an endemic area in Northern Nigeria. 3,265 persons aged from 3 to 20 years were examined by skin snip in Abuja Emirate. The results are shown in a series of tables presenting the distance of different age groups from the breeding grounds of *Simulium damnosum*, the proven vector of the disease. The data indicated that both infection rate and intensity of infection increased with age within any one distance range, but decreased with distance from the rivers in any one age group. Initial infection occurred at about the same age in both sexes but high levels of infection were reached earlier in males than in females. The geography of the survey area and the way of life of the people are briefly described. In a separate section of the paper Macnamara presents an interesting mathematical consideration of the survey data based on

the assumption that (i) in a population which (a) has not been subjected to immigration from areas where the disease being investigated has a different incidence rate, and which (b) is exposed in all age groups to the same risk of infection and (ii) in an area where the disease has a negligible incubation period and neither causes a high mortality nor undergoes remission or recovery during the time span covered by the ages of those surveyed; then the proportion of the population of any given age which does not show a stated level of infection can be found from the following equation:  $Y = 1 - (1 - e^{-kt})^n$  where  $Y$  equals the proportion of the population of age  $t$  which does not suffer from an infection of given intensity,  $t$  equals age of the sample population,  $k$  equals proportion of persons who do not suffer at time  $t$  becoming infected to a given intensity by time  $t + 1$ ,  $n$  equals number of times an infection must be introduced to produce an infection of a given intensity,  $e$  equals Napierian base. The resulting hypothetical curves were found to correspond with the observed data, and the implications of this finding are discussed, with a consideration of alternative hypotheses and observed discrepancies. It is suggested that (i) from the age of 5-7 years to 18 years the risk of developing patent infection from one year to the next is uniform; (ii) only one introduction of infection is required to produce a + intensity or more in that area of the skin by which the skin over the right iliac crest is influenced; (iii) four to seven introductions of infection are required to produce a ++ intensity; (iv) about 8-15 introductions of infection are required to produce +++ intensity; (v) no more introductions of infections are required to give a certain intensity of infection in areas where the risk of infection is low than where it is high, and hence the vector fly carries a more or less constant load of infective worms, no matter whether in the first place it bites a patient who is heavily or lightly infected. N.J.

(13c) Gibson reports that at the inspection of 100 cysts of bovine origin suspected to be those of *Cysticercus bovis*, 25 were found to be viable *C. bovis*, four were not *C. bovis* and of the remaining 71, 35 were caseous and 36 were calcified. Histological examination involving staining with haematoxylin and eosin, van Gieson's method and the periodic acid-Schiff technique revealed the presence of cestode tissue in only three out of 18 caseous and calcified cysts, a proportion too small to justify the use of histological methods as a routine procedure. Condemnation of carcasses in which degenerate cysts alone are evident can therefore only be made after more thorough examination has revealed viable ones. N.J.

(13d) Jordan reports on experiments conducted on persons with low microfilaraemia in order to establish their role in the spread of *Wuchereria bancrofti* by *Culex fatigans* in East Africa. With the exception of anomalous results, the incidence of mosquitoes showing pre-infective and infective larvae was higher when they had fed on persons with a high number of microfilariae in their blood. 2.6% of mosquitoes had viable larvae 11.5 to 13.5 days after feeding on persons with 0.5 microfilariae per 20 cu.mm. of blood but 7.3% were infected after feeding on persons with 5 microfilariae per 20 cu.mm. of blood. The average percentage of *C. fatigans* carrying developing microfilariae which had fed on persons having already received a preliminary treatment with over 500 mg. of diethylcarbamazine was 52.6 as compared with 57.7% of the group fed on blood of untreated persons. Microfilariae which remained in the blood after diethylcarbamazine treatment developed normally to infective larvae when ingested by *C. fatigans*. Diethylcarbamazine in a second blood meal did not affect the further development of infective larvae already present in the mosquito host. The author concludes that for success in eradication schemes, complete clearance of microfilariae from the blood of all persons in the treated zone must be aimed at, especially in areas where the mosquito biting rate is high. N.J.

(13e) Kirk *et al.* report on onchocerciasis in the Sudanese Republic. Endemic zones were characterized by patchy distribution of the foci of infection. The sole vector of *Onchocerca volvulus* in the Sudan, *Simulium damnosum*, was found to breed usually near rapid and well aerated water and, more rarely, on mud in comparatively placid water. Suramin treatment caused death of the adult worms and disappearance of nodules in patients who had received 4 gm. or more of the drug several months previously. It had, however, numerous side effects



and was dangerously toxic in effective doses. Moreover it was without effect in cases showing posterior ocular manifestations. Diethylcarbamazine was useful as a preliminary to suramin treatment. Used alone it caused rapid disappearance of microfilariae but had no effect on the adult worms. Pentostam was ineffective in the doses used. Dry season anti-*Simulium* campaigns combined with diethylcarbamazine treatment are suggested as the most hopeful control measures in this difficult area. N.J.

(13f) Edeson & Buckley report on the results of inoculating infective larvae of *Wuchereria malayi* into domestic cats with a view to discovering their fate in the tissues of the vertebrate host. Many of the animals died at various intervals after infection. In 39 out of 54 cats which were killed or died during the experiment, adult worms were found. Migration was rapid, worms being recovered in press preparations of the lymphatic glands and vessels within 16 hours of inoculation. A total of 3,124 infective larvae was injected but only 408 adult *W. malayi* (13%) were recovered. The site of recovery was usually related to the site of inoculation of the larvae, but some migrated to the internal lymph vessels. Two moults occurred, one at 9-10 days and another at 35-40 days. The first microfilariae were found in the peripheral blood 75 days after inoculation. The females increased in size up to 288 days while the males showed no increase after 64 days. N.J.

#### 14—Archives of Dermatology.

a. VAN DE ERVE, J., 1959.—“Vibrapuncture treatment for creeping eruption.” 79 (1), 101.

(14a) Van de Erve recommends vibrapuncture as the treatment of choice in creeping eruption. After washing the skin with an antiseptic lotion the estimated site of the larva is covered with hydrocortisone acetate solution or lightly frozen with Freon or Fluoroethyl to reduce itching and discomfort and then thoroughly criss-crossed several times with the needles set for 2 to 3 mm. depth. The larvae are killed. No scar is left. A high cure rate is claimed. J.M.W.

#### 15—Archives of Disease in Childhood.

a. DICKSON, W. & WOODCOCK, R. C., 1959.—“Visceral larva migrans.” 34 (173), 63-67.

(15a) Dickson & Woodcock describe in detail a typical case of visceral larva migrans in a two-year-old girl. The literature is briefly reviewed and the important signs and symptoms discussed. The authors consider that, on account of the frequency of toxocariasis in cats and dogs in this country, the disease may occur more commonly than is realized and may account for some of the cases that are diagnosed as Loeffler's syndrome or tropical eosinophilia. J.M.W.

#### 16—Australian Journal of Agricultural Research.

a. BREMNER, K. C., 1959.—“Parasitic gastro-enteritis and its effect on the blood and liver copper levels of dairy calves.” 10 (3), 471-485.

(16a) Bremner studied the influence of mixed helminth infections and *Bunostomum phlebotomum* infections on the blood and liver copper levels of dairy calves. In the first experiment three of six calves were infected with *Haemonchus placei*, *B. phlebotomum*, *Oesophagostomum radiatum* and *Cooperia* spp. Nine weeks after infection the mean of the liver copper levels dropped from 234 p.p.m. to 193 p.p.m., whereas in the control calves it rose or remained constant. The infected calves were then given an anthelmintic. The copper values continued to drop until the 13th week, when they reached a minimum of 165 p.p.m. The degree of depression appeared to be related to the degree of infection. Subsequently they rose to a mean of 200 p.p.m. 20 weeks after infection. Blood copper levels dropped on the fifth week to 0.052 mg. per 100 ml. Following the treatment they quickly regained their normal values. Haemoglobin levels in the infected calves fell to a mean of 3.4 gm.% before the treatment and resumed normal values (the mean 7.6 gm.%) eight weeks after it. Red cell volume percentage followed approximately the curve of haemoglobin levels. On the day of anthelmintic



treatment the mean serum protein concentration was 3.5 gm.%. Six weeks after the treatment it rose to 6.3 gm.%. The second group of calves was divided into three pairs, i.e. two control calves, two calves with *B. phlebotomum* and two with all four nematodes. The results showed that liver copper levels were influenced to a smaller degree by daily blood withdrawal than by the mixed infections. In a third experiment two control calves and two calves infected with *B. phlebotomum* only received into the rumen 50 ml. of 3% copper sulphate solution each. 5.6% and 6.5% of copper was absorbed by the control calves and 2.5% and 3% by the infected calves. Whole blood and plasma copper levels were depressed by infections with *B. phlebotomum* predominating. Plasma copper levels were unaffected by chronic *B. phlebotomum* infection or heavy infections where *H. placei* predominated. N.J.

### 17—Australian Veterinary Journal.

- a. ROBERTS, F. H. S. & KEITH, R. K., 1959.—“The efficiency of phenothiazine against the immature stages of the bovine stomach worm, *Haemonchus placei* (Place 1893) Ransom 1911.” 35 (2), 38–39.
- b. FORSYTH, B. A., 1959.—“The effect of purity of phenothiazine on anthelmintic efficiency.” [Correspondence.] 35 (3), 99.

(17a) Roberts & Keith treated *Haemonchus placei* infections in dairy calves with phenothiazine. 28 calves received 200 mg. of the drug per lb. body-weight 4, 8, 12, 16, 40 and 42 days after infection. The treatment had a high efficiency against 4, 8, 40 and 42-day-old worms. 14-day-old parasites proved to be strongly resistant to the drug. The results of the treatment against 12 and 16-day-old worms, as indicated by the number of eggs per gm. of faeces, varied from calf to calf. N.J.

(17b) Forsyth gives a preliminary report on the effect of purity of phenothiazine on anthelmintic efficiency. The drug, the purity of which was established chromatographically, was tested against *Ostertagia* spp., *Trichostrongylus* spp. and *Chabertia ovina* in 350 sheep. Efficacy proved to be poor when purity fell to 70%. It increased to 80% when the purity of the drug increased to 85%. Further, anthelmintic efficiency was inversely proportional to particle size. It is suggested that to obtain good results with phenothiazine it should have a minimum of 85% purity and a specific surface area of at least 12,000 sq. cm. per gramme. N.J.

### 18—Berliner und Münchener Tierärztliche Wochenschrift.

- a. NICKEL, E. A., 1959.—“Untersuchungen über den Ascaridenbefall bei Schweinen einer Mastprüfungsanstalt und seine Auswirkungen auf die Gewichtszunahme der Tiere.” 72 (1), 7–10. [English summary p. 10.]
- b. LIEBMANN, H. & BOCH, J., 1959.—“Die Bedeutung der Endoparasiten bei Haustieren in Süddeutschland.” 72 (6), 106–109. [English summary p. 109.]
- c. BOCH, J. & FORSTNER, M. J., 1959.—“Untersuchungen über den Wurmbefall des Auer- und Birkwildes.” 72 (11), 220–223. [English summary p. 223.]
- d. PAVLOV, P., TATAROV, B., LAZAROV, E. & STOEV, P., 1959.—“Untersuchungen über die Wirkung von o-Kresol auf Askarideneier.” 72 (11), 224–225. [English summary p. 225.]
- e. RAPIĆ, S., BAIĆ, S., JEMRIĆ, K. & MALČIĆ, B., 1959.—“Die Röntgendiagnostik der Schweinefinnigkeit.” 72 (15), 300–303. [English summary p. 303.]

(18a) Nickel has studied the effect of *Ascaris* infection on the fattening of pigs. The investigation was spread over 18 months during which period 89 groups each containing four pigs of the same litter were observed from three months of age until they attained a weight of 110 kg. to 118 kg. Of the total of 356 pigs, 257 (72.2%) were positive for *Ascaris*, although infections were light (up to 42 ascarids). It was found that pigs with an infection of from 6 to 42 ascarids attained a weight of 110–118 kg. eight to fourteen days later than their worm-free or very lightly infected litter mates. The slowing-up of weight increase was not always correlated with the degree of infection. A.E.F.



(18b) Liebmann & Boch summarize and cumulate the results of earlier workers, published between 1953 and 1958, on the incidence of helminths in domestic animals in southern Germany. Of a total of 2,525 horses, 95% were positive for strongyles and 15% for ascarids. In 16,580 head of cattle infection with gastro-intestinal nematodes was 47%, *Haemonchus* (23%) being by far the commonest. Of 4,965 pigs 66% had nematode infections with *Oesophagostomum* (43%), *Hystrongylus* (38%) and *Ascaris* (29%) occurring most frequently. 2,190 sheep and 273 goats showed an 18% *Fasciola* infection, while 92% of sheep and 88% of goats harboured stomach worms (*Strongyloides*, *Haemonchus*, *Trichostrongylus*, *Nematodirus*, *Oesophagostomum* and *Chabertia*).  
A.E.F.

(18c) Boch & Forstner report on the helminth parasites of game birds in the Bavarian Alps. Ten *Tetrao urogallus* and 22 *Lyrurus tetrix* were examined in the spring of 1958. *Raillietina* (*Skrjabinia*) *cesticillus* was recovered from five *T. urogallus* and eight *L. tetrix*, *Hymenolepis villosa* from two *T. urogallus*, *Ascaridia compar* from seven of each species, and *Capillaria alpina* n.sp. from the duodenum of nine *T. urogallus* and of ten *L. tetrix*. The new species is described and illustrated; it is differentiated from *C. caudinflata* by the shape of the posterior end of both male and female, and by the length of the vulvar appendage in the female.  
A.E.F.

(18d) Pavlov *et al.* report that *o*-cresol, in a concentration of 4%, kills both embryonated and non-embryonated ova of *Parascaris equorum* within five minutes. Solutions of 2% to 3% will also kill all *P. equorum* ova within two to three hours. They therefore recommend *o*-cresol as an efficacious disinfectant for the control of ascarid infections.  
A.E.F.

(18e) Rapić *et al.* used X-ray diagnosis to determine the presence of *Cysticercus cellulosae* in the muscles of live pigs. Fully developed cysticerci were revealed by a round or oval shadow. Undeveloped cysticerci could not be revealed in this way. The preferred localizations were the elbow bend and popliteal space.  
N.J.

## 19—British Medical Journal.

- a. PAINE, D. H. D., LOWER, E. S. & COOPER, T. V., 1959.—“Treatment of trichuriasis with dithiazanine. A preliminary report.” Year 1959, 1 (5114), 93–95.
- b. ANON., 1959.—“Vaccine against worm.” [Annotation.] Year 1959, 1 (5122), 637.
- c. FACEY, R. V., 1959.—“Human fascioliasis.” [Correspondence.] Year 1959, 1 (5129), 1115.
- d. DYSON, F. L., 1959.—“Human fascioliasis.” [Correspondence.] Year 1959, 1 (5132), 1301.

(19a) Dithiazanine was given to six mental patients infected with whipworm at a dose rate of 200 mg. three times daily for five days. The patients' ages ranged from 14 to 20 years and weight from 30 to 64 kg. Faecal examination at the end of treatment showed all stools to be negative for whipworm eggs and a second examination one month later showed only one case positive with low egg count. Adult *Trichuris trichiura* appeared in the stools from the third to the fifth day of treatment. Vomiting occurred in three of the six patients treated but otherwise side effects were negligible. A further and larger scale trial is in progress and will be reported later.  
O.D.S.

(19b) The discovery of the development of the vaccine against husk in cattle containing living infective larvae of *Dictyocaulus viviparus* attenuated by X-rays is briefly recounted and its importance emphasized.  
J.M.W.

(19c) Apparently as a result of eating water-cress, of which they were enthusiastic consumers, four people in a market town in Hampshire recently became infected with *Fasciola hepatica*. A full report is promised later.  
R.T.L.

(19d) Writing from Porthcawl [in Glamorgan, Wales] Dyson states that he has seen five cases of human fascioliasis since 1951, three occurring towards the end of 1957. All the patients had painful enlargement of the liver, pyrexia, asthenia, loss of weight, sweating and a high degree of eosinophilia. Eggs were present in the faeces but were only found three months after the onset of the clinical symptoms. The infections were apparently acquired



from eating water-cress except in one instance which was attributed to chewing grass. Laparotomy had been performed on three of the patients before the true nature of the disease was recognized.

R.T.L.

## 20—British Veterinary Journal.

- a. ALLAN, D., 1959.—“A field study of a natural outbreak of parasitic bronchitis in calves.” **115** (1), 19–26.

(20a) In this paper the author describes an attempt to utilize experimental methods in a field study of a naturally occurring outbreak of parasitic bronchitis. The evidence gained in this investigation points to the inducement within susceptible calves of the inhibiting factor of acquired immunity. Calves grazing on a field with a larval count of less than one per lb. of herbage were transferred to a field with a larval count of 29 larvae per lb. of herbage. They showed reduced larval output in the faeces when compared with other animals which had not been similarly treated before exposure. The field which had the low larval count appeared to be safe and even beneficial pasture.

K.H.

## 21—Bulletin de l'Académie Polonaise des Sciences. Classe II. Série des Sciences Biologiques.

- a. GRABDA, B., 1959.—“*Astiotrema trituri* sp.n. (Trematoda—Plagiorchidae) from the small intestine of *Triturus vulgaris* L.” **7** (1), 17–21.

(21a) *Astiotrema trituri* n.sp., which Grabda describes and figures from *Triturus vulgaris*, is the first member of this genus to be recorded from an amphibian. It is distinguished from other members of the genus by the position of the posterior testis which lies behind the end of the caeca, the small size of the cirrus sac and the size of the eggs which are almost twice the size of those in other species. The new species appears to occupy a position intermediate between *A. odhneri* and *A. reniferum*. The intermediate hosts were the fresh-water snail *Coretus corneus* and the Cladocera *Simocephalus expinosus* and *Eurycercus lamellatus*.

S.W.

## 22—Bulletin. Ministry of Food and Agriculture, Ghana.

- a. LEATHER, R. I., 1959.—“Diseases of economic plants in Ghana other than cacao.” No. 1, vii+40 pp.

(22a) Amongst other diseases of economic crops in Ghana, Leather describes briefly root-rot of Canary bananas caused by *Anguillulina* [*Radopholus*] *similis* and root-knot due to *Meloidogyne* spp. on *Phaseolus* spp., *Beta vulgaris* (beetroot), *Brassica* spp., carrot, curcubits, lettuce, *Hibiscus esculentus*, onion, shallot, parsley (*Petroselinum crispum*), pepper (*Capsicum* spp.), *Amaranthus caudatus*, tobacco and tomato. There are brief recommendations for control by means of fallow in the dry season and rotation with non-susceptible crops.

M.T.F.

## 23—Bulletin of the Zoological Society, College of Science, Nagpur.

- a. AGARWAL, S. M., 1959.—“On the egg and miracidium of *Euclinostomum heterostomum* (Rudolphi, 1809) (Clinostomatidae, Trematoda).” **2**, 47–52.

(23a) Agarwal describes the egg and miracidium of *Euclinostomum heterostomum* and compares them with those of *Clinostomum marginatum* and *C. giganticum*. All three miracidia are similar in the number and arrangement of the epidermal plates (6:8:4:3), the number of flame cells and the excretory pattern, the nature of the protrusible papilla, apical gland and eye and the number and position of the penetration glands. They differ in that the brain mass has four lobes in *E. heterostomum*, only two in *C. marginatum* and is almost ovoid in *C. giganticum*, and in the size of the germ ball in relation to the body. The eggs of *E. heterostomum* are laid singly and those of the two species of *Clinostomum* in strings.

S.W.

## 24—California Agriculture.

- a. RASKI, D. J., 1959.—“Sugar-beet nematode activity.” **13** (5), 4, 14.

**25—California Fish and Game.**

- a. LECHLEITNER, R. R., 1959.—“Some parasites and infectious diseases in a black-tailed jackrabbit population in the Sacramento Valley, California.” **45** (2), 83–91.

(25a) Lechleitner has made a survey of the parasites of *Lepus californicus* in the Sacramento Valley. The helminths recorded are: *Biogastranema affinis* and an unidentified nematode, adult *Cittotaenia pectinata* and *Raillietina* (*Paroniella*) *retractulus* [*retractilis*], and larval *Taenia* sp. and *Multiceps* sp. Although the livers of more than 300 jackrabbits were examined for *Fasciola hepatica*, no evidence of infection was found. S.W.

**26—Canadian Insect Pest Review.**

- a. BAKER, A. D., 1959.—“Some records of plant parasitic nematodes encountered in Canada in 1958.” **37** (1), 120–122.

(26a) Baker records the occurrence on various hosts in Canada during 1958 of some 29 named species representing 16 genera of plant-parasitic nematodes. The records include *Meloidogyne hapla* on *Lonicera ligustrum*, *Viburnum opulus*, *V. trilobum* and Japanese barberry, *M. arenaria* on *Deutzia gracilis*, Japanese barberry, *Lysimachia* and catalpa, *M. incognita* on *Lonicera ligustrum* and pink weigelia, *Tylenchorhynchus maximus* on red clover, flax and oats, *T. dubius* on red clover, strawberry and spruce, *T. brevidens* in peony roots, *Psilenchus gracilis* on strawberry, some *Agrostis gigantea* seed heads heavily infested with *Anguina agrostis*, *Goetholdsteiniera goodeyi* on strawberry, wild strawberry and fig, *Criconeimoides lobatum* from onion sets, *Hemicycliophora similis* on peony, *Xiphinema americanum* and *Longidorus sylphus* on strawberry, *Pratylenchus penetrans* on vetch and rose, *P. pratensis* on lucerne and pine, and *P. minyus* on lucerne, red clover and sumac. D.J.H.

**27—Canadian Journal of Botany.**

- a. MOUNTAIN, W. B. & PATRICK, Z. A., 1959.—“The peach replant problem in Ontario. VII. The pathogenicity of *Pratylenchus penetrans* (Cobb, 1917) Filip. & Stek. 1941.” **37** (3), 459–470.

(27a) By inoculating microbiologically sterile *Pratylenchus penetrans* on to seedlings of Lovell peach growing under sterile conditions, Mountain & Patrick show that the nematodes are capable, by themselves, of producing brown lesions on the roots and causing retarded growth of the seedlings, and hence are primary pathogens. The formation of the lesions is shown to be due, at least in part, to the hydrolysis of amygdalin in the roots, resulting in the production of toxic substances which kill the root cells in advance of the nematodes. It is shown that *P. penetrans* can itself hydrolyse amygdalin and so can several of the bacteria and fungi which are normally found in the rhizosphere. It appears therefore that peach root rot is due not only to the nematodes but also to the results of invasion by other soil organisms which are either carried into the roots by the nematodes or follow them in and produce phytotoxic substances. It is suggested that the ability of Shalil peach to support a high population of *P. penetrans* without damage is because the roots contain considerably less amygdalin than those of Lovell. Peach replant failure is therefore basically a root rot disease in which *P. penetrans*, acting both as pathogen and incitant, is the most important primary parasite but in which also soil fungi and bacteria are involved. M.T.F.

**28—Canadian Journal of Zoology.**

- a. SCHAD, G. A., 1959.—“Nematodes from varanid lizards of Borneo. A description of *Abbreviata borneensis* n.sp. (Nematoda: Physalopteridae) and records of two other species.” **37** (1), 71–74.  
 b. PREMVATI, 1959.—“Studies on *Strongyloides* of primates. V. Synonymy of the species in monkeys and apes.” **37** (1), 75–81.  
 c. LUBINSKY, G., 1959.—“*Echinococcus granulosus* in domestic animals in Western Pakistan.” **37** (1), 83.

(28a) Schad records *Amplificaecum varani* Baylis & Daubney, 1922 from *Varanus rudicollis* at Matang, Sarawak; *Tanqua tiara* (Linstow, 1879) from *V. dumerili* at Dewhurst Bay, North



Borneo and *Abbreviata borneensis* n.sp. from *V. rudicollis* (stomach) at Matang, First Division, Sarawak (type host and locality) and also from the type host at Sapagaya Forest Reserve, Borneo and Kalabakan, Tawau District, North Borneo and also from *V. salvator* at Santubong, First Division, Sarawak. The new species closely resembles *A. oligopapillata* (Kreis, 1940) and *A. bancrofti* (Irwin-Smith, 1922), differing from the first in the form of the spicules, a more extensive tubercular field and in having papillae on the posterior border of the anus in the male, and from the second species in lacking a tooth below each pair of submedian teeth, in the tubercular field not forming two prolongations posteriorly, in the form of the left spicule and in lacking a peri-cloacal rim.

W.G.I.

(28b) Premvati concludes from a study of the anatomy and life-history of *Strongyloides fülleborni* Linstow, 1905, that *S. cebus* Darling, 1911 and *S. simiae* Hung & Hoeppli, 1923 are both indistinguishable from *S. fülleborni*. She supports this by describing the great amount of morphological variation resulting when the species is allowed to develop under different environmental conditions. The morphology of both sexes of the free-living generation is described in detail.

W.G.I.

(28c) Lubinsky reports that in an abattoir in Rawalpindi the incidence of hydatid observed between June and December 1953 was: five of 237 goats, three of 65 sheep, four of 26 cattle and the one water buffalo examined. Multilocular cysts were found in only two cows. Two of eleven stray dogs shot harboured adult *Echinococcus granulosus*.

S.W.

## 29—Československá Parasitologie.

- a. ASADOV, S. M., 1959.—[The distribution of helminths of ruminants according to ecological zones of the Azerbaijan S.S.R.] **6** (1), 59–67. [In Russian.]
- b. BORCHERT, A., 1959.—“Über die Organisation der Bekämpfung der Parasitosen in der Deutschen demokratischen Republik.” **6** (1), 69–72.
- c. ERGENS, R., 1959.—“Nálezy dalších druhů rodu *Gyrodactylus* Nordmann (Monogenoidea) v ČSR.” **6** (1), 73–85. [German summary p. 85.]
- d. ERGENS, R., 1959.—“Nálezy dalších druhů rodu *Dactylogyrus* Diesing (Monogenoidea) v ČSR a vliv lokalisace na morfologické změny chitínových částí haptoru *Dactylogyrus hemiamphibothrium*.” **6** (1), 87–92. [German summary p. 92.]
- e. ERHARDOVÁ, B., 1959.—“*Oswaldonema rysavyi* n.sp. und *Vianella chinensis* n.sp. (Nematoda: Heligmosomatidae) bei chinesischen Nagern.” **6** (1), 93–96.
- f. MACKO, J. K., 1959.—“K helmintofaune potápkovitých vtákov na východnom Slovensku.” **6** (1), 127–158.
- g. SHULTS, R. S., 1959.—[Helminths and helminthiases of sheep in Kazakhstan and their control.] **6** (1), 195–209. [In Russian.]
- h. ZOLTAI, N., 1959.—“Über die Erforschung der Naturherdinfektionen in Ungarn.” **6** (1), 215–216.
- i. PAWŁOWSKI, Z., 1959.—“Taeniarhynchosis in Poznań district (Poland) in the years 1953–1957.” **6** (2), 75–82.
- j. PROKOPIC, J., 1959.—“Cizopasní červi našich hmyzožravců. Systematicko-faunistická studie a ekologicko-zoogeografické zhodnocení.” **6** (2), 87–134. [English & Russian summaries pp. 129–131.]

(29a) Asadov lists 79 helminth species from ruminants according to their ecological distribution in the Azerbaijan S.S.R. In addition to data from the literature, the author examined 15 *Capra cylindricornis*, eight *Rupicapra rupicapra caucasica*, five *Cervus elaphus maral*, eight *Capreolus capreolus capreolus*, eleven *Gazella subgutturosa*, three dromedaries, 18 sheep, 25 goats, 10 cattle, five zebu and five buffaloes. The author expresses his opinion concerning complexes of the helminth fauna, which could be changed if one or more ecological condition changed.

N.J.

(29c) Ergens reports on the finding of: *Gyrodactylus decorus* from *Alburnus alburnus*, *Rutilus rutilus* and *Scardinius erythrophthalmus*; *G. gobionium* from *Gobio gobio*; *Gyrodactylus laevis* from *Phoxinus phoxinus*; *G. longiradix* from *Acerina cernua*, *Perca fluviatilis* and *Lucioperca lucioperca*; *G. macronychus* from *Phoxinus phoxinus*; *G. nemachili* from *Nemacheilus barbatulus*;

*G. wagneri aphyae* from *Phoxinus phoxinus*; *G. wagneri cernuae* from *Acerina cernua*; *G. wagneri lucii* from *Lucioperca lucioperca* and *G. parvicopula* from *Rutilus rutilus* and *Abramis brama*. The monogeneans are described in detail with illustrations. N.J.

(29d) Ergens, completing the list of trematodes found in fish in 1956-57, describes four more species. They are: *Dactylogyrus chondrostomi* from *Chondrostoma nasus*; *D. minor* from *Alburnus alburnus*; *D. suecicus* from *Rutilus rutilus* and *D. nanus* from *R. rutilus* and *A. alburnus*. The author also describes *D. hemiamphibothrium* found on the fins of *Acerina cernua*. These specimens differ in the form of the hooks from *D. hemiamphibothrium* from the gills as described by Nybelin in 1937. It is suggested that these differences are influenced by the localization of the parasite. N.J.

(29e) Erhardová describes and illustrates two new nematodes, *Oswaldonema rysavyi* n.sp. from the small intestine of *Rattus rattus alexandrinus* and *Cricetulus barabensis griseus*, and *Viannella chinensis* n.sp. from the small intestine of *C. b. griseus*. Both nematodes were found by Ryšavy in China in 1955. Characters differentiating the new species from existing species of their respective genera are not given. N.J.

(29f) Macko lists and describes the helminths found in 35 specimens of *Colymbus cristatus*, 32 of *C. caspicus caspicus*, three of *C. ruficollis ruficollis* and two specimens of *C. griseigena*. The birds were examined in 1954-57 during the seasons of spring floods. The incidence of infection of *C. cristatus* was with trematodes 82.8% and cestodes 85.7%. 37.5% of *C. c. caspicus* were infected with trematodes and 84.3% with cestodes. One specimen of *C. r. ruficollis* was infected with trematodes and one with cestodes. Both *C. griseigena* carried trematode and cestode infections. Individual birds harboured from one to eleven species of helminths. Eight families of trematodes and four families of cestodes were represented. The number of helminth species parasitizing the birds varied from year to year. The species which appeared with approximately the same incidence each year were: *Echinochasmus* (*Echinochasmus*) *coaxatus*, *Diplostomum gavium*, *Dubininolepis furcifera*, *D. podicipina*, *Tatria biremis* and *Ligula colymbi*. The helminths found are described and illustrated. N.J.

(29g) Shults, working in Kazakhstan, found that 75% of losses of sheep caused by infectious diseases were attributable to helminthiasis. The author explains the distribution of helminths ecologically and gives a list of 76 species of trematodes, cestodes and nematodes occurring in sheep in Kazakhstan. N.J.

(29h) Zoltai reports that in the course of a parasitological expedition in Hungary in 1952 no *Trichinella* larvae were found in 1,031 rodents and insectivores examined. N.J.

(29i) Pawłowski reports on the occurrence and treatment of *Taenia saginata* in Poznań. Altogether 330 patients were treated between 1953 and 1957. The 20-40 age group showed the greatest incidence of infection. 60.3% of the total number of infections were adult females. In 62% of 192 cases infections occurred between September and February. Duration of infection ranged from several months to 30 years. 41% of 44 patients were cured with a single dose of 0.8 gm. to 1.0 gm. of atebirin given *per os*. Atebrin treatment was less successful in males than in females since, in a group of 14 men and 20 women, 29% and 50% of cases were cured respectively. 163 patients were given 200 gm. to 400 gm. of pumpkin seeds preceded by 15 mg. to 30 mg. of luminal and followed by a castor oil or saline purge. 60% were cured. This treatment was less successful with children. Cestodin manufactured in 1954 and in 1956 was given at a dose of three 1.25 gm. tablets a day for five days. In some cases cestodin (of 1956) treatment was repeated and in others supplemented with luminal. Cestodin (of 1954) showed 87% efficacy while that of 1956 gave only 40% of cures. Doubling the dose of the 1956 variety or supplementing it with luminal did not produce a marked increase in its efficacy. It was also found that the value of cestodin decreased with the time of storage. N.J.



(29j) Prokopič examined 1,268 specimens of Insectivora belonging to 12 species in the years 1954–57. The following helminths were found: Trematoda—14 species, Cestoda—34 species, Nematoda—27 species and Acanthocephala—four species. The incidence of helminthic infection in the insectivores examined was: *Sorex araneus* 73%; *S. minutus* 55%; *S. alpinus* 65%; *Neomys fodiens* 73%; *N. anomalus* 42%; *Crocidura suaveolens* 65%; *C. leucodon* (unestablished); *Erinaceus europaeus* 87%; *E. roumanicus* 93%; *Talpa europaea* 67%. The cestodes *Rodentolepis erinacei* and *R. steudeneri* from hedgehogs are considered to be different species [morphological differences are not given in the text]. *Choanotaenia crassiscolex* and *Anomotaenia subterranea* from shrews, sometimes considered to be identical, are described by the author as different on the basis of the number, size and arrangement of the rostellar hooks. *Vigisolepis spinulosa* and *V. barbascolex* are considered to be identical, differing only in the disposition of the hooks. *Vampirolepis magnirostellata magnirostellata* differs from *V. magnirostellata soltysi* only in the number of hooks. *Arion rufus*, *Helix pomatia*, *Agriolimax agrestis*, *Cepaea hortensis* and *Limax maximus* were successfully infected with the larvae of *Crenosoma striatum* under laboratory conditions. The following are new host records: *Soricinia diaphana* in *Sorex alpinus hercynicus*, *Soricinia soricis* in *Sorex araneus* and *S. minutus*, *Neoskrjabinolepis singularis* in *Crocidura suaveolens*, *Vigisolepis spinulosa spinulosa* in *S. alpinus* and *S. minutus*, *Vampirolepis neomydis* in *Neomys anomalus milleri*, *Longistriata depressa* in *S. alpinus*. *Capillaria petrowi* was also found from a new host, *Sorex araneus*. The larval stages of *Dilepis undula*, *Taenia leuckarti* and *Schistometra conoides*, of which the adults parasitize birds, were found in shrews; the author is of the opinion that this may represent an intermediate step in the adaptation of these cestodes to mammalian instead of invertebrate hosts. By further evolution the insectivores could become intermediate or definitive hosts of these parasites. The relationship of the parasites to the feeding habits and environmental conditions of both intermediate and definitive hosts is discussed. N.J.

### 30—Chinese Veterinary Journal.

- a. PAN, D. Y., 1959.—[A report on the extraction of *Coenurus* in sheep.] Year 1959, No. 2, p. 40. [In Chinese.]
- b. CHIA, C. F., 1959.—[A report on the treatment of onchocerciasis in donkeys and mules.] Year 1959, No. 2, pp. 41–42. [In Chinese.]
- c. LEI, S. S., 1959.—[A simple way for examining parasite eggs in faeces.] Year 1959, No. 2, p. 54. [In Chinese.]
- d. YAU, J. L., CHI, J. C. & LI, S. C., 1959.—[An experiment using a mixture of bean oil and carbon tetrachloride in the treatment of the sheep liver fluke.] Year 1959, No. 3, pp. 77–78. [In Chinese.]
- e. K'UNG, F. Y., CHAO, Y. C., CHEN, C. L., HSIEH, S. T., YANG, C. T. & LI, M. M., 1959.—[A preliminary report on the use of 'Dipterex' as an anthelmintic for nematodes in the digestive tract of sheep and goats.] Year 1959, No. 4, pp. 120–122. [In Chinese.]

(30a) The author describes the operative procedure for extracting a superficially situated *Coenurus* from the brain of a sheep. After incision and scraping the bone away, the brain membranes are removed carefully. Then, with a scalpel, the cyst is loosened. The sheep is then lifted upside-down and the cyst allowed to drop out on its own. All such operations were successful. L.S.Y.

(30b) The author reports onchocerciasis in donkeys and mules for the first time in China, in the Peking suburbs. He gives a brief review of the Russian literature on the subject and follows this with personal observations on diagnosis, treatment and surgical operation. L.S.Y.

(30c) The author describes the brine flotation method as unsatisfactory, and recommends and describes in detail the centrifugal sedimentation method. L.S.Y.

(30d) The authors report heavy mortality of sheep infected with the sheep liver-fluke. They found that oral administration of a mixture of 80 ml. to 100 ml. bean oil with 5 ml. to 6 ml. carbon tetrachloride killed the worms in nine days. If the carbon tetrachloride dose is raised to 8 ml. to 9 ml. the worms are killed in five days. L.S.Y.

(30c) Dipterex was given in two subcutaneous injections to 22 animals (sheep and goats) while five more were held as controls. The drug was found to be an effective anthelmintic for intestinal worms such as *Haemonchus*, *Bunostomum*, *Nematodirus*, *Oesophagostomum* and *Trichuris*. The toxicity was tolerable. Unfortunately the worm burden in the experimental animals was low and the experiments are therefore only suggestive and not conclusive. L.S.Y.

### 31—Cornell Veterinarian.

- a. WHITLOCK, J. H., 1959.—“*Elaphostrongylus*, the proper designation of *Neurofilaria*.” 49 (1), 3–14.

(31a) Whitlock redescribes *Neurofilaria cornellensis* Whitlock, 1952 from specimens obtained from a blind deer (*Odocoileus virginianus borealis*) in Pennsylvania and from a ram. As a result of the study of the specimens he concludes that *N. cornellensis* is indistinguishable from *Pneumostrongylus tenuis* Dougherty, 1945 and he refers the latter species to *Elaphostrongylus* Cameron, 1931. The genus *Elaphostrongylus* is rediagnosed and *Pneumostrongylus* partim fide Dougherty, 1945, *Odocoileostrongylus* Shults, 1951, *Parelaphostrongylus* Boev & Shults, 1950, *Neurofilaria* Whitlock, 1952 and *Protostrongyloides* Baudet & Verney, 1957 are considered synonymous with it. The genus is diagnosed as: slender thread-like worms; no teguminal sheath; distinct sclerotized stoma; six reduced lips; bursa small, rounded, not distinctly lobate; spicule with pectinate alae; gubernaculum present; crura, if present, short.

W.G.I.

### 32—Countryman. Nicosia.

- a. ANON., 1959.—“It can be avoided.” [*Echinococcus granulosus*.] May 1959, pp. 10–11.

### 33—Current Science. Bangalore.

- a. AHSAN, S. N., 1959.—“On the occurrence of the metacercariae of *Clinostomum* sp. in *Trichogaster fasciatus*.” [Correspondence.] 28 (1), 32–33.  
 b. RAMAKRISHNA, G., 1959.—“Occurrence of *Mononchus* sp. (fam. Mononchidae: Tripyloidea) a plant nematode from India.” [Correspondence.] 28 (3), 119.  
 c. NIRULA, K. K., 1959.—“Root knot nematode on *Colocasia*.” [Correspondence.] 28 (3), 125–126.  
 d. SRIVASTAVA, H. D. & DUTT, S. C., 1959.—“Parafilaria in buffaloes caused by *Parafilaria sahaii* n.sp.” [Correspondence.] 28 (3), 128–129.

(33a) *Clinostomum* metacercariae were found for the first time in *Trichogaster fasciatus* in India. All 40 fish examined from the area of Patna were infected, with an average of six metacercariae in each. Other fish (about 25 species) from similar habitats were not infected. Descriptions are given of the metacercariae and of partially developed adults, a few of which were recovered from experimentally infected pigeons.

G.I.P.

(33b) Decline of Mandarin orange trees in Kerala, South India, was found to be due to root peeling and root rot associated with arthropod larvae, minute earthworms and large numbers of a predatory nematode, *Mononchus* sp. Ramakrishna states that the eelworms are suspected of being responsible for the decline.

R.W.T.

(33c) Nirula reports that *Meloidogyne javanica* causes the formation of small to large galls on the roots and corms of *Colocasia antiquorum* Schott. in Patna, India. Two photographs are given.

R.W.T.

(33d) The anterior portion of a female *Parafilaria*  $\frac{1}{4}$  in. to  $\frac{1}{2}$  in. long, was recovered from a cutaneous abscess in a buffalo from Namkum, Bihar, India. Srivastava & Dutt tentatively assign it to a new species based on the presence of about ten transverse series of cuticular tubercles extending  $50\mu$  from the anterior end. No illustration is given.

R.W.T.



**34—Deutsche Tierärztliche Wochenschrift.**

- a. ENIGK, K. & DÜWEL, D., 1959.—“Die Therapie beim Bandwurmbefall des Huhnes.” **66** (1), 10–16. [English summary pp. 15–16.]
- b. DIRKSEN, G., 1959.—“Stephanofilarien als Ursache der ‘Sommerwunden’ des Rindes in den nordwestdeutschen Weidegebieten.” **66** (4), 85–88. [English summary p. 88.]

(34a) Chickens experimentally infected with *Davainea proglottina*, *Raillietina cesticillus*, *Choanotaenia infundibulum* or *Hymenolepis carioca* were tested with 75 different chemical compounds of widely varying character. These included recognized taeniocides but the effects were largely insignificant except for certain organo-tin compounds. *D. proglottina* proved to be the most resistant tapeworm. Barium antimony tartrate in combination with hexachlorophene was effective against the other three tapeworms but the only compound that proved efficient in removing the scolex of all four species was di-n-butyl tin dilaurate given at 282 mg. per chicken. This organo-tin compound was also partly effective in removing *Ascaridia* and *Heterakis*.  
O.D.S.

(34b) Dirksen finds that summer sores on cattle in north-west German grazing fields appear in spring, and at first form oval areas 3 cm. × 8 cm. with a smooth brick-red surface. Later an uneven red-brown crust forms. The sores are frequently on, and in front of, the udder, the base of the teats, and the knee but may occur also on other parts of the body. The animals become restless due to the irritation of the lesions and the annoyance caused by flies which feed on the exudate from the sores. Microfilariae  $155\mu \times 4\mu$  can be found in newly formed sores but disappear after some weeks. Adult worms are found in subepidermal cyst-like spaces surrounded by a zone of histiocytes and fibroblasts. The sores heal over in the autumn but recur the following year, either over the sites of the adult worms in the same places as in the previous year, or in new places to which the microfilariae have migrated. The worms are a species of *Stephanofilaria* and the lesions resemble those produced by *S. stilesi* in North America and a dermatitis described by Ivanov in Bulgaria.  
W.A.F.W.

**35—Dissertation Abstracts.**

- a. PERRY, V. G., 1959.—“Anatomy, taxonomy, and control of certain spiral nematodes attacking blue grass in Wisconsin.” **19** (7), 1509.
- b. HALL, J. E., 1959.—“Studies on the biology of the trematode family Lecithodendriidae Odhner.” **19** (8), 1902.

(35a) Perry points out that certain allegedly monosexual species of *Helicotylenchus* are actually hermaphrodites and possess a small sperm-producing organ and lateral vulva flaps; that the junction of the oesophagus and the intestine in this genus is a small ovoid chamber with a sphincter muscle; and that there are five nuclei, not three, within the basal lobe of the oesophagus. Reference is made to a revision of the genus *Helicotylenchus* involving the placing of *Gottholdsteineria* in synonymy therewith and the description of four new species—*H. digonicus*, *H. microlobus*, *H. pumilus* and *H. platyurus*; but no details are given. The three first-named species incite a root disease of Kentucky blue grass (*Poa pratensis*) characterized by discoloured and abbreviated roots, pale or chlorotic leaves, and stunting. They may be a major cause of summer dormancy of blue grass. 1,2-dibromo-3-chloropropane and o-2,4-dichlorophenyl o,o-diethylphosphorothioate gave excellent control. [Editorial Note. Under the International Rules of Zoological Nomenclature (Article 25) the publication of a new zoological name is invalid unless accompanied by (i) a summary of characters which differentiate or distinguish the genus or species from other genera or species, or (ii) a definite bibliographical reference to such summary of characters, and further (iii) in the case of a generic name, of the definite unambiguous designation of the type species. Under the International Rules a microfilm is not a publication as far as nomenclature is concerned. The four new specific names in this abstract are therefore invalid.]  
J.M.W.

(35b) The dissertation reports on the examination for larval Lecithodendriidae of prosobranch snails and aquatic arthropods, mostly from near Lafayette, Indiana. Following leads thus obtained, naiads of *Hexagenia limbata* were successfully infected with *Cercaria*

**35—Dissertation Abstracts (cont.)**

- c. HUTCHISON, W. F., 1959.—“Studies on the hydatid worm, *Echinococcus granulosus*, in Mississippi.” **19** (8), 2193.
- d. CRITTENDEN, H. W., 1959.—“Pathogen-suscept relationship of *Meloidogyne incognita acrita* and *Glycine max*.” **19** (9), 2219.
- e. MYER, D. G., 1959.—“Studies on the life history of *Mesostephanus kentuckiensis* (Cable, 1935) comb.nov. (Trematoda: Cyathocotylidae).” **19** (9), 2413–2414.

*neustica*. The naiads containing metacercariae at least 42 days old were fed to six newly hatched chicks and one young hamster, all of which yielded ovigerous adults of *Mosesia chordeilesia* when examined 3 to 28 days later. In areas where infected snails were found, *M. chordeilesia* was present in the wood pewee (*Contopus virens*). Attempts to infect snails by feeding embryonated eggs remained unsuccessful. The other 12 cercariae found included ten new species which are *C. tremaglandis* n.sp., *C. papiliogona* n.sp., *C. adoxovirgula* n.sp., *C. neusticoides* n.sp., *C. pyxiceps* n.sp. and *C. cordivirgula* n.sp. from *Pleurocera acuta*; *C. bryobulga* n.sp. from *Goniobasis* sp.; and *C. notura* n.sp., *C. pinguisoma* n.sp. and *C. celatoglandis* n.sp. from *G. livescens*. The other two, *C. tranoglandis* and *C. meringura*, are redescribed. The excretory pattern was determined for nine of these species. A differential key to virgulate cercariae of North America is given. Seven probably different species of metacercariae were found in arthropods. Of those that could be identified, one from dragonfly naiads belonged to a species of *Eumegacetes* and another developing in naiads of *Hetaerina americana* is described as *Neoprosthodendrium progeneticum* n.g., n.sp. [Details of the key and of descriptions of the new genus and species are not given in the abstract.] G.I.P.

(35c) In Mississippi, a survey of hydatidosis in pigs showed that there was a significant reservoir of infected dogs in many areas. Rodents were not susceptible to the larval stages and the domestic cat, opossum and raccoon did not become infected with the adults of *Echinococcus granulosus*. Hydatid antibodies have been demonstrated in sera of naturally infected pigs and man, in artificially immunized rabbits and in a few experimentally infected sheep, goats, pigs and calves. The haemagglutination test, using hydatid cyst fluid from pigs, proved more sensitive than the complement fixation and the precipitin tests. G.I.P.

(35d) Crittenden examined the roots of susceptible and resistant varieties of *Glycine max* after inoculating them with *Meloidogyne incognita* var. *acrita* larvae. Healthy plants were also examined. No cytological or histological differences were observed between the roots of uninfected healthy susceptible and resistant varieties of soya beans. These differences were evident in the case of infected plants. The giant cells occupied much smaller spaces in the roots of resistant varieties and the nematode's head was at the side of these cells. In the susceptible varieties the head was surrounded by the giant cells, which had dense cytoplasm and irregularly thickened walls. The areas of larval invasion of the susceptible plants showed an increased number and size of pericycle cells, whereas this phenomenon was, if at all, manifested to a much lesser degree in the resistant varieties. In susceptible soya bean plants there was also a reduction in the number of tertiary roots as a result of infection of the primary and secondary ones. Soya beans were most susceptible to *M. incognita* var. *acrita* infection at sowing time, but they remained so to some degree for nine weeks after sowing. N.J.

(35e) Myer describes the life-history of *Mesostephanus kentuckiensis* n.comb., cercariae of which were found in 3·18% of *Goniobasis livescens* in streams of central Ohio. Daughter sporocysts were recovered from snails, from which cercariae were emerging. The cercariae encysted and developed as metacercariae in experimentally infected *Lebistes reticulatus*, tadpoles of *Rana clamitans* and *R. catesbeiana* and in adult *R. pipiens*. Fish species from Olentangy River, near the Ohio State University, harbouring *M. kentuckiensis* metacercariae were *Ictalurus natalis*, *Camptostoma anomalum*, *Cyprinus carpio*, *Notropis cornutus*, *Pimephales notatus*, *Semotilus atromaculatus*, *Amploplites rupestris*, *Lepomis macrochirus*, *Micropterus dolomieu* and *Pomoxis annularis*. *Mesostephanus kentuckiensis* metacercariae were fed to *Natrix sipedon*, *N. septemvittata*, *Procyon lotor*, laboratory mice and one-day-old chicks. Only the last mentioned became infected. Metacercariae became infective for chickens after 22 to 28 days'



**35—Dissertation Abstracts (cont.)**

- f. LEWIS, G. D., 1959.—“Biology and control of the onion bloat nematode, *Ditylenchus dipsaci* (Kühn) Filipjev.” **19** (10), 2441.
- g. LEVINE, D. M., 1959.—“Studies on the immunology and serology of schistosomiasis.” **19** (10), 2694.
- h. SROUFE, Jr., S. A., 1959.—“Studies on the morphology and development of *Mazocraeoides olentangiensis* n.sp. (Trematoda: Monogenea), a parasite of the gizzard shad, *Dorosoma cepedianum* (Le Sueur).” **19** (10), 2696–2697.
- i. ENDO, B. Y., 1959.—“Studies on certain ecological factors affecting the biology of the lesion nematode.” **19** (11), 2708.
- j. POWELL, N. T., 1959.—“The nature of the black shank-root-knot disease complex in flue-cured tobacco and its control by breeding for resistance to both pathogens.” **19** (11), 2709–2710.

stay in *Lebistes reticulatus*. The first eggs of the parasite appeared in the faeces of chicks seven days after infection. The life-span of the adult trematode in chicks was 14 to 17 days. *Cercaria yankapinensis* Goodman, 1951 is assigned to the new *tetis* (b) subgroup which differs from the subgroup (a) by the presence of a ventral sucker. A new subgroup, *kasenyi*, is erected for cercariae with six pairs of flame cells in the body and two pairs in the tail-stem. Unnamed cercariae of Maxon & Pequegnat, 1949, *C. kasenyi* Fain, 1953, *C. schoutedeni* Fain, 1953 and *C. multiplicata* Premvati, 1955 are included in this subgroup. N.J.

(35f) Lewis found that *Ditylenchus dipsaci* overwinters in the organic soils of southern New York mainly as pre-adults and larvae, some downward migration occurring in the autumn. Mortality is high in frozen soil. Individuals can persist in the soil in the absence of a suitable crop for at least two years. Excellent control without crop injury in soil used for growing onions was achieved by fumigation with D-D at rates of 50 or more gallons per acre. The efficacy of D-D was shown to be directly related to soil temperature and inversely related to soil moisture. D-D was less effective than Telone in the ratio 2:3. J.M.W.

(35g) Levine describes a series of experiments on immunity to schistosomiasis and related serological reactions. He found that the longevity of infected mice was significantly increased by immunization with metabolic products of *Schistosoma mansoni* cercariae and adults. Passive transfer of antiserum from hamsters infected with *Schistosomatium douthitti* had no effect in protecting mice against this schistosome. Antigenic analysis by means of the agar double diffusion technique indicated from one to seven antigen-antibody bands for the various life-cycles stages of *S. douthitti* and *Schistosoma mansoni*. Sera of infected animals contained antibodies which reacted with somatic antigens, metabolite antigens and egg antigens of the schistosomes. J.M.W.

(35h) [The full account of this work occurs in *J. Parasit.*, 1958, **44**, 643–646. For abstract see *Helm. Abs.*, **27**, No. 247ez.]

(35i) In the south-eastern U.S.A., of about 30 plants tested, six were classified as favourable and four as very favourable to *Pratylenchus zeae* and nine as favourable to *P. brachyurus*. Very high populations of *P. brachyurus* can be obtained on maize and peanut and very low ones on oats and *Crotalaria*. Norfolk sandy loam proved the most favourable soil, Portsmouth loam intermediate and Cecil clay loam least suitable for infection and reproduction of the nematodes on suitable hosts and for their migration through the soil. In none of the soils did migration occur in the absence of suitable host plants. Changes in nematode populations due to light intensity and nitrogen nutrition treatments of the plants were only significant when based on whole root systems. For North Carolina four species of *Pratylenchus* were identified: *P. brachyurus*, *P. penetrans*, *P. scribneri* and *P. zeae*. G.I.P.

(35j) Resistance to *Meloidogyne incognita* and *M. incognita* var. *acrita* was incorporated by backcross procedure into black shank resistant varieties of flue-cured tobacco (Dixie Bright 101 and Coker 139). Black shank was much more severe in plants of the recurrent parents on inoculation with both pathogens than on inoculation with the fungus (*Phytophthora parasitica* var. *nicotianae*) alone. Similarly, when inoculated with both pathogens, the incidence of black shank was much higher among root-knot susceptible segregates of the backcross progeny than among resistant ones. The histology of affected plant portions is described. G.I.P.

## 35—Dissertation Abstracts (cont.)

- k. RIGGS, R. D., 1959.—“Studies on resistance in tomato to root-knot nematodes.” 19 (11), 2710.
- l. FRIEDL, F. E., 1959.—“Studies on the *in vitro* survival of larval stages of the trematode, *Fascioloides magna*, with analyses of the hemolymph and tissue culture of a snail host, *Lymnaea stagnalis*.” 19 (11), 3058–3059.
- m. KIRK, D. E., 1959.—“The life cycle and pathology of *Spirorchis elegans* Stunkard, 1923.” 19 (11), 3061–3062.
- n. SWARTZ, L. G., 1959.—“Life cycle studies of *Rictularia coloradensis* Hall 1916 (Nematoda: Thelaziidae).” 19 (11), 3063–3064.
- o. WYANT, K. D., 1959.—“Study of immunity in the white rat to larval *Hydatigera taeniaeformis*: effects of splenectomy, adrenalectomy, and cortisone injection.” 19 (11), 3065.

(35k) Resistance to four species of root-knot nematodes was found in a wild species of *Lycopersicon*. Larvae penetrated the roots of resistant and susceptible plants equally freely, but invasion of resistant tissues resulted in the death of the surrounding tissue (after 48 hours) and subsequently of the larvae (after 96 hours). When larvae from nematodes reproducing on resistant tomato plants were continuously transferred to other resistant plants, virulent populations of *Meloidogyne incognita*, *M. incognita* var. *acrita* and *M. arenaria* developed which attacked the tomato line carrying the *Mi* gene and which are thought to be new physiological strains. G.I.P.

(35l) A number of investigations pertinent to the eventual artificial cultivation of the larval stages of *Fascioloides magna* have been undertaken. The most suitable basic medium for snail tissues was the haemolymph of *Lymnaea stagnalis* or Carriker's physiological salt solution. The haemolymph is chemically analysed. Embryonated ova of *F. magna* could be induced to hatch by a reduced atmosphere of 15–20 cm. mercury at room temperature and in light. Of the various media tested in survival studies with rediae, Clark's solution (for insect tissue culture) was the most suitable for general use at pH 7. Antibiotics were tolerated to 800 units per ml. of penicillin and streptomycin together. Autoclaved snail haemolymph extended survival to 13 days, far in excess of any other medium tried. The amino-acids, alanine, hydroxyproline, proline and serine, and the amino-acid amides asparagine and possibly glutamine lengthened survival, but many other media and substances were indifferent or reduced survival. G.I.P.

(35m) *Spirorchis elegans* was found in *Chrysemys p. picta* in Georgia. Hatched miracidia were used to infect young *Helisoma* and adult *Menetus dilatatus*, and nine days later young daughter sporocysts were present in the liver. The cercariae, which were apharyngeate and furcocercous, emerged from the snails 17 to 23 days after infection and were used to infect *C. p. marginata* and *Pseudemys elegans*. After seven to ten weeks the turtles passed eggs, and worms were present in the heart, brain, brachiocephalic artery and liver, and eggs in all the major organs. The various larval stages are described. G.I.P.

(35n) The life-cycle of *Rictularia coloradensis*, a frequent parasite of *Peromyscus* in east-central Illinois, has been studied. Larvae, hatching from eggs in the hind-gut of the flour beetle *Tribolium confusum*, developed to the third stage in the epithelium of the gut wall. At 30°C. and 70% relative humidity, the first moult occurred on the third or fourth day and the second on the eighth or ninth day. The third moult took place in the final host (*P. leucopus noveboracensis*) after 12 to 48 hours. The fourth moult was not observed, but a fully developed male was recovered after 17 days. Natural intermediate hosts also include *Ceuthophilus* sp., *C. divergens* and *Udeopsylla robusta*, and still other arthropods may be implicated. G.I.P.

(35o) Natural and acquired immunity to *Hydatigera taeniaeformis* were studied in white rats. Cortisone given before and after infection (2.5 mg. daily) did not have an over-all effect on the total number of cysts established (no “early” immunity). Cortisone-treated rats always harboured a higher percentage of living cysts than untreated ones (lowered “late” immunity). Adrenalectomy increased the resistance of rats to initial infection but decreased natural late immunity. Splenectomy alone had no effect on the degree of infection, but it increased early resistance produced by artificial immunization and also increased natural late immunity. The mechanisms involved in these reactions are described. G.I.P.



**35—Dissertation Abstracts (cont.)**

- p. KRUPP, I. M., 1959.—“Anemia and immune response to hookworm infection in the dog.” **19** (12), 3281–3282.
- q. WYKOFF, D. E., 1959.—“A study of the host-parasite relations in *Clonorchis sinensis* infection, with special reference to the rabbit as an experimental host.” **19** (12), 3285–3286.
- r. PRESTAGE, J. J., 1959.—“The structure of the ovary and oviduct of *Ascaris lumbricoides* var. *suum* with special reference to the rachis.” **19** (12), 3425–3426.

(35p) Krupp infected 30 dogs with *Ancylostoma caninum* larvae. The adult worms resulting from the infection were suspended in distilled water, quick frozen in absolute alcohol and dry ice and used in the preparation of antigens for serological tests *in vitro*. It was found that increasing intensity of infection caused a depression in egg production. Autopsies of 17 dogs revealed that the jejunum, especially the mid-portion of it was the habitat of choice of the parasites. When, as in heavy infections, the ileum and duodenum were affected there appeared to be a maximum number of worms which could populate the intestine regardless of the number of infective larvae administered. Gross haemorrhage was produced by shifting worms in the intestine due to overcrowding. Using siderophilic radio-active Fe<sup>59</sup> it was found that the presence of hookworms stimulated erythropoiesis. The rate of bone marrow function was also increased. It is concluded that blood was lost by haemorrhage rather than by age alone. An elevation of the  $\gamma$ -globulin fraction and a relative reduction of the  $\alpha$ ,  $\beta$  and albumin fractions were revealed by electrophoretic analyses of the serum proteins. Serological tests performed on various protein and polysaccharide fractions of the hookworms with antiserum from infected dogs showed the presence of antibodies.

N.J.

(35q) Wykoff reports that metacercariae of *Clonorchis sinensis* remained alive for at least 60 days after being removed from the secondary host and frozen. When administered to laboratory animals, one-third of them developed to maturity in rabbits and guinea-pigs. Only one-tenth of the metacercariae reached maturity in rats. An inoculum of 1,000 metacercariae proved lethal to guinea-pigs, whereas rabbits withstood even larger inocula. The prepatent period averaged 22 days in rabbits and 20 days in guinea-pigs. Egg production by *C. sinensis* steadily increased up to the 17th week. After that period cyclic variation with the maxima at approximately ten-week intervals was observed. The mean number of eggs per worm per day during the week of death of 16 animals was about 4,000. The mean number of eggs per gramme of faeces per worm was about 100. Preliminary ether extractions of antigen from *C. sinensis* at  $-18^{\circ}\text{C}$ ., before extraction with buffered saline solution eliminated anti-complementary activity and reduced cross reactivity without affecting the capacity to react specifically with homologous antiserum. It is concluded that the new antigen may be used with success to determine the antibody response in experimentally infected rabbits. Attempts to infect *Bulinus tentaculatus*, *Gillia altilis*, *Flumicola coloradoense* and *F. fusca* with *C. sinensis* were unsuccessful.

N.J.

(35r) Prestage examined sections of the ovary and oviduct of *Ascaris lumbricoides* var. *suum*. Light and electron microscopes as well as histochemical methods were used. It was found that the terminal cell at the proximal end of the ovary is the germinal stem from which the germ cells derive. Distinct cells with large nuclei surrounded by a thin layer of cytoplasm were observed in the region immediately under the terminal cell. Germ cells were observed to be attached to the rachis which was seen as a branched body in the upper region of the growth zone and as a circular body in the middle and distal regions. The cytoplasm of the rachis is continuous with that of the germ cells. A few scattered mitochondria, endoplasmic reticulum, glycogen particles and lipid droplets were observed in the rachis in the upper region of the growth zone. The quantity of organelles and inclusions increased as the rachis was examined more distally. It is concluded that the rachis has its origin from the germ cells forming a syncytium after being initially separated from one another. The rachis is considered as a nutritive reservoir for the primary oocytes. The epithelium of the ovary consists of a single layer of cells. The cells of the upper region of the growth zone were found to contain secretory vesicles. The oviduct was found to consist of a single layer of epithelial cells. These

cells are of the squamous type in the proximal region, columnar type in the middle region and club-shaped type in the distal region. Microvilli, subepithelial spaces and muscle bands are structural features of the oviduct and were not observed in the ovary. It was revealed by histochemical methods that glycogen and lipid were the chief nutrients in the eggs and rachis.

### 36—Experimental Parasitology. New York.

- a. EVANS, A. S. & STIREWALT, M. A., 1959.—“Serologic reactions in *Schistosoma mansoni* infections. V. Localization of CHR and cercarial agglutinating factors in electrochromatographically fractionated human sera.” 8 (1), 1–9.
- b. AGOSIN, M. & ARAVENA, L. C., 1959.—“Anaerobic glycolysis in homogenates of *Trichinella spiralis* larvae.” 8 (1), 10–30.
- c. MATHIES, Jr., A. W., 1959.—“Certain aspects of the host-parasite relationship of *Aspiculuris tetraptera*, a mouse pinworm. I. Host specificity and age resistance.” 8 (1), 31–38.
- d. MATHIES, Jr., A. W., 1959.—“Certain aspects of the host-parasite relationship of *Aspiculuris tetraptera*, a mouse pinworm. II. Sex resistance.” 8 (1), 39–45.
- e. READ, C. P. & PHIFER, K., 1959.—“The role of carbohydrates in the biology of cestodes VII. Interactions between individual tapeworms of the same and different species.” 8 (1), 46–50.
- f. WYKOFF, D. E., 1959.—“Studies on *Clonorchis sinensis*. II. Development of an antigen for complement fixation and studies on the antibody response in infected rabbits.” 8 (1), 51–57.
- g. READ, C. P., DOUGLAS, L. T. & SIMMONS, Jr., J. E., 1959.—“Urea and osmotic properties of tapeworms from elasmobranchs.” 8 (1), 58–75.
- h. VERNBERG, W. B. & HUNTER, W. S., 1959.—“Studies on oxygen consumption in digenetic trematodes. III. The relationship of body nitrogen to oxygen uptake.” 8 (1), 76–82.
- i. COSTELLO, L. C. & GROLLMAN, S., 1959.—“Studies on the reactions of the Krebs cycle in *Strongyloides papillosus* infective larvae.” 8 (1), 83–89.
- j. SCHILLER, E. L., 1959.—“Experimental studies on morphological variation in the cestode genus *Hymenolepis*. I. Morphology and development of the cysticercoid of *H. nana* in *Tribolium confusum*.” 8 (2), 91–118.
- k. HEYNEMAN, D. & WELSH, J. F., 1959.—“Action of homologous antiserum *in vitro* against life cycle stages of *Hymenolepis nana*, the dwarf mouse tapeworm.” 8 (2), 119–128.
- l. MILLEMANN, R. E. & THONARD, J. C., 1959.—“Protease activity in schistosome cercariae.” 8 (2), 129–136.
- m. LAURIE, J. S., 1959.—“Aerobic metabolism of *Moniliformis dubius* (Acanthocephala).” 8 (2), 188–197.

(36a) Evans & Stirewalt have used continuous flow electrochromatographic technique to fractionate the sera of men infected with *Schistosoma mansoni*. One fraction, which formed 0.6% of the total serum protein, contained all the pericercarial envelope-forming and cercarial agglutinating activity. The active fraction in 0.15 ionic strength sodium chloride gave two minor fast-sedimenting fractions, and one major slow-sedimenting fraction ( $S_{20}=5.1$ ) which contained all the activity. The amino-acid composition of the active material was somewhat different from that of “normal” human  $\gamma$ -globulin.

W.P.R.

(36b) Agosin & Aravena demonstrated the presence of a number of enzymes and substrates concerned in phosphorylative glycolysis in homogenates of larvae of *Trichinella spiralis*. Lactic acid was formed in large amounts only when pyruvate was added to re-oxidize the reduced diphosphopyridine nucleotide formed during glycolysis. Small amounts were formed by other routes; hexokinase and glucose-6-phosphate dehydrogenase were present. With suitably fortified dialysed homogenates, acetic, valeric, and caproic acids were formed as well as lactic acid when pyruvate was present.

W.P.R.

(36c) Mathies undertook to ascertain whether natural species resistance occurs in experimental infections with *Aspiculuris tetraptera* and whether infections with this worm are altered by the age of the host. Administration of infective eggs of the parasite to *Mus musculus* (albino laboratory mouse), *Rattus norvegicus albinus* (albino laboratory rat), *Peromyscus maniculatus bairdii* (common deer mouse) and *Meriones unguiculatus* (Mongolian gerbil) proved that only the first-named species is a suitable host. Infection of mice of different ages



showed that female mice become resistant to infection at the time of the first oestrus, whereas male mice develop resistance gradually as they become older. The author considers that the differing phenomena of age resistance in male and female hosts may be related to the level of gonadal hormones.

J.M.W.

(36d) Continuing his investigations of the host-parasite relationship between *Mus musculus* and *Aspicularis tetraptera*, Mathies has shown that the sex of the host has a modifying influence upon the intensity of infection with *A. tetraptera*, worm burdens being significantly lower in female than in male mice; that gonadectomy of the host significantly lowers the worm burden in both sexes; and that oestradiol in male mice is detrimental to the establishment of a heavy infection, whereas testosterone seems to have little or no effect on the worm burden in either males or females.

J.M.W.

(36e) Read & Phifer found that *Hymenolepis citelli* and *H. diminuta*, maintained separately in hamsters, were reduced in size when the carbohydrate in the diet of the hosts was reduced. *H. citelli* was affected proportionally more than *H. diminuta*. When single *H. citelli* and *H. diminuta* were maintained together in the hamster, individuals of both species were reduced in size although *H. citelli* was affected most. If the carbohydrate intake of the host was reduced, the size of *H. citelli* was not affected by the presence of *H. diminuta* whereas *H. diminuta* was further reduced in size. When rats were infected with varying numbers of *H. diminuta* the mean size of the individuals decreased with increasing size of the infection.

W.P.R.

(36f) Wykoff found that the specificity of antigens prepared from dehydrated adult *Clonorchis sinensis* by extraction with buffered saline was improved if the material was first extracted with ether.

W.P.R.

(36g) Read *et al.* showed that up to 3.7% of the dry weight of *Calliobothrium verticillatum* from the dogfish was urea which was also in high concentration in the fluid in which the parasite lived *in vivo*. *In vitro* the addition of urea to the salt solutions in which the worms were incubated prevented the initial uptake of water observed in all the salt solutions which were used. The concentration of urea in the worm was a function of the concentration of urea in the incubation media. There was an inverse relationship between the tissue chloride in the worm, and permeability of the worms to urea and water was affected by the calcium in the medium. Some of this work was repeated with two other cestodes from elasmobranchs, *Anthobothrium* and *Inermiphyllidium*; similar results were obtained. The addition of urea to salt media proved toxic to a number of platyhelminths which do not normally live in environments containing this substance.

W.P.R.

(36h) Vernberg & Hunter found that the uptake of oxygen ( $\mu\text{l/hr}/\mu\text{gm.N}$ ) decreased as the total nitrogen in *Gynaecotyla adunca* increased during the life-cycle. Studies with five species of cercariae showed a significant correlation between total body nitrogen and oxygen uptake.

W.P.R.

(36i) Costello & Grollman measured the activity of homogenates of infective larvae of *Strongyloides papillosus* in reducing methylene blue in the presence of substrates of the Krebs cycle. Though no activity could be obtained with pyruvate and  $\alpha$ -ketoglutarate, the authors obtained indirect evidence that the dehydrogenases for these substrates were present and they concluded that the Krebs cycle functioned in the larvae.

W.P.R.

(36j) Schiller sets out to study the normal development and morphology of the cysticercoid stage of the cestode *Hymenolepis nana* (v. Siebold, 1852), selected for its easily maintained, short life-cycle. Gravid segments were fed to the invertebrate host and after 15 days cysticercoids recovered and administered to the vertebrate host by stomach tube. The hatching of eggs ingested by *Tribolium confusum* was studied, but attempts to hatch

viable embryos *in vitro* were unsuccessful. Cysticeroids were examined at intervals. They were found to remain infective throughout the life of the beetle and to survive metamorphosis when in a pupal host. The rate of cysticeroid development is influenced by temperature and *T. confusum* proved to be a more suitable host than *Tenebrio molitor*. The suitability of seven insect hosts was investigated and it is shown that the size of the cysticeroid cercoma varies with the size of host species. Under conditions of "crowding", cercoma and capsule are smaller and infectivity probably lower. In starved *Tribolium confusum*, the incidence of abnormal larvae is higher. Schiller did not observe withdrawal of the scolex during development and he considers specimens with extruded scoleces as abnormal; they are not infective to the vertebrate host and may be induced by X-irradiation. There are 17 figures, 5 tables and 38 references. J.M.

(36k) Heyneman & Welsh prepared a rabbit antiserum against adult *Hymenolepis nana*. The morphological changes induced by the action of the antiserum *in vitro* on the eggs, cysticeroids and adult *H. nana* are described. The antiserum reduced the infectivity of eggs to one-twentieth and the infectivity of cysticeroids to about one-eighth. W.P.R.

(36l) Millemann & Thonard found that the cercariae of *Schistosomatium douthitti* and *Schistosoma mansoni* produced proteases but did not possess a true collagenase. W.P.R.

(36m) Laurie found that glycogen (about 6.7% of the dry weight) and trehalose (about 1.8%) were the major carbohydrates in *Moniliformis dubius*. Under aerobic conditions *in vitro* glycogen was synthesized from glucose, fructose, mannose and maltose. Acetic, lactic and formic acids were excreted whether exogenous substrates were present or not; glucose, fructose, mannose and maltose increased the amounts of lactic acid which were formed. With the exception of glucose these sugars also stimulated respiration. W.P.R.

### 37—*Hemera Zoa*. Buitenzorg.

- a. MUCHLIS, A., 1959.—"Tambahan daftar tjtjing<sup>2</sup> jang berparasit pada hewan menjusui dan unggas di Indonesia." **66** (1/2), 6-9.
- b. MUCHLIS, A., 1959.—"Distomatosis paru<sup>2</sup> pada biri<sup>2</sup>." **66** (3/4), 71-74. [English summary p. 73.]

(37a) Muchlis supplies a list of worms affecting birds and mammals in Indonesia, together with some notes, intended as a supplement to the check-lists compiled by Adiwinata and published in *Hemera Zoa*, 1955, **62**, 229-247; 1958, **65**, 231-233. The following species are reported: *Phaneropsolus simiae*, *Oesophagostomum maurum*, *Ternidens simiae* and *Globocephalus simiae* from monkeys; *P. oviformis* from *Nycticebus javanicus*; *Galactosomum canis* from *Canis familiaris*; *Ceylonocotyle scoliocoelium* and *Fischoederius elongatus* from *Bubalus bubalus*; *Echinostoma revolutum* from *Meleagris gallopavo*; *Apatemon globiceps* from *Gallinula chloropus orientalis*; *Anoplocephala gigantea* from *Rhinoceros sumatrensis* and *R. sondaicus*; *Paranoplocephala mamillana* and an unidentified species of the same genus from *Tapirus indicus*; *Diplogynia sandgroundi* and *Hymenolepis javanensis* from *Dendrocygna javanica*; *H. furcouterina* from the black-bellied snakebird; *H. megalops* from *Anas boschas*; *Physocephalus sexalatus* and *Hyostrongylus rubidus* from *Sus scrofa*; *Physaloptera tumefaciens* from *Macacus* sp.; *Ancylostoma malayanum* from *Ursus malayanus*; *Moniliformis dubius* from *Rattus norvegicus*. It is remarked that whereas Adiwinata found only *Gastrothylax crumenifer* in the gullets of water buffaloes, this species is now rare and appears to have been replaced by *Fischoederius elongatus* which is found in large numbers in over 90% of animals slaughtered. J.M.W.

(37b) Muchlis records a case of pulmonary infection with adult *Fasciola hepatica* in a sheep. There was acute pneumonia and peri-bronchial inflammation. The pathology and possible causes of the occurrence of this parasite in ectopic foci are briefly discussed in the light, not only of this case, but also of the findings of other authors. J.M.W.



**38—Indian Journal of Child Health.**

- a. FERNANDO, P. V. D., 1959.—“Preliminary investigation of *Carica papaya* seeds as a vermifuge.” 8 (2), 96–100.

(38a) Fernando treated 25 one to nine-year-old children against roundworm infection with *Carica papaya* seeds. A total dose of 210–4,200 seeds was given over 7 to 21 days. Only 8% of complete cures was obtained and an average of 1.6 ascarids expelled per patient treated. It is concluded that papaya seed as an ascaricide is almost a total failure. 18 of the patients were then treated with piperazine citrate three days after papaya seed treatment and the number of ascarids expelled then averaged 19.3 per patient. 14 out of the 18 were cured.

N.J.

**39—Journal of the Kentucky State Medical Association.**

- a. FLOYD, JR., J. B., 1959.—“Round worm infestation as seen by the surgeon.” 57 (2), 182–184.

**40—Journal of Parasitology.**

- a. WALTON, A. C., 1959.—“Some parasites and their chromosomes.” 45 (1), 1–20.  
 b. PIKE, E. H., 1959.—“The effect of piperazine citrate on hatching and migrating larvae of *Ascaris lumbricoides*.” 45 (1), 46.  
 c. SARMIENTO, L., 1959.—“Description of *Paratractis hystrix* (Diesing, 1851) gen.nov. (Nematoda: Atractidae) from *Podocnemis dumeriliana*.” 45 (1), 65–68.  
 d. SAUNDERS, D. C., 1959.—“Microfilariae and other blood parasites in Mexican wild doves and pigeons.” 45 (1), 69–75.  
 e. TURNER, J. H., 1959.—“Experimental strongyloidiasis in sheep and goats. II. Multiple infections: development of acquired resistance.” 45 (1), 76–86.  
 f. ZIMMERMANN, W. J., HUBBARD, E. D. & BIESTER, H. E., 1959.—“Studies on trichiniasis in Iowa wildlife (1955–56 and 1956–57 seasons).” 45 (1), 87–90.  
 g. WYKOFF, D. E., 1959.—“Studies on *Clonorchis sinensis*. IV. Production of eggs in experimentally infected rabbits.” 45 (1), 91–94.  
 h. THOMAS, J. D., 1959.—“Trematodes of Ghanaian sub-littoral fishes. I. The family Monorchidae.” 45 (1), 95–113.  
 i. SOGANDARES-BERNAL, F. & HUTTON, R. F., 1959.—“*Bivescula tarponis*, a new trematode in the tarpon, *Megalops atlanticus* (Cuv. & Val.), from the west coast of Florida.” 45 (1), 114–118.

(40a) Walton summarizes information on the chromosome numbers of a large number of parasites of different groups and comments on the taxonomic value of this data. W.P.R.

(40b) Each of 40 mice was inoculated orally with 5,000 infective eggs of *Ascaris lumbricoides*. The mice were divided into four groups. One group was given 100 mg. per kg. body-weight of piperazine citrate one hour before infection and at hourly intervals thereafter until six doses were given; another group was given 300 mg. per kg. of the drug intraperitoneally daily for seven days, treatment commencing 24 hours after infection. The remaining two groups were retained as untreated controls. All mice were killed ten days after infection and the tissues examined for larvae by means of pepsin digest or tissue presses. Larval counts were made in brain, spleen, liver, lungs, kidneys and carcass muscle of each mouse. In the first group where the newly hatched larvae were exposed to the drug the mean number of larvae recovered per mouse was 33 compared with 495 in the controls. In the second group where the larvae were in the migratory stage during the period of treatment the mean larval recovery was 198 and 211 for treated and control groups respectively. The results indicate that piperazine citrate has a marked effect against newly hatched larvae but no appreciable effect against the migrating forms. O.D.S.

(40c) Sarmiento redescribes *Ascaris hystrix* Diesing, 1851 (Nematoda) from a water turtle (*Podocnemis dumeriliana*), collected at Pucallpa, Peru, and refers it to a new genus, *Paratractis* (Atractinae), as the type and only species. The genus is characterized by three lips with an outer circle of ten papillae and an inner circle of six papillae, by unequal spicules and a gubernaculum and by the body being covered by scale-like cuticular projections. W.G.I.

(40d) Microfilariae were found in 32 out of 58 *Zenaida asiatica mearnsi*, one out of 14 *Z. a. asiatica*, five out of 46 *Z. macroura marginella*, and seven out of 31 *Columba flavirostris flavirostris*. None were found in one *Scardafella inca* or three *Leptotila verreauxi angelica*. Statistical analysis of variation of the measurements of the microfilariae showed that there were probably eight forms of which four were found in *Z. a. mearnsi*, one in *Z. macroura marginella*, two in *C. f. flavirostris* and one in both *Z. a. asiatica* and *Z. macroura marginella*. The microfilariae differed from each other also in the shape of the body and the arrangement of the nuclei. W.A.F.W.

(40e) Turner gives more details of work previously reported [for abstract see Helm. Abs., 25, No. 105cc]. Lambs and kids were infected with *Strongyloides papillosus* by applying to their skin 10,000, 20,000 or 30,000 larvae at two-day intervals for 20 days. Other lambs and kids were infected by one application of 30,000 larvae and then placed on pasture which had been deliberately contaminated with faeces containing eggs of *S. papillosus*. None of these animals developed any acute symptoms and all survived a challenging dose of 30,000 larvae, whereas when parasite-free lambs were similarly challenged, some died. H.D.C.

(40f) Zimmermann *et al.* report that the incidence of *Trichinella spiralis* in Iowa during the hunting and trapping seasons of 1955 to 1956 and 1956 to 1957 was 4.5% in mink, 8.5% in fox, 0.9% in opossum, 0.6% in raccoon, 2.5% in striped skunk, 2.2% in spotted skunk and 4.8% in coyote. Nine out of 10 sampling areas had at least two infected species. N.J.

(40g) Wykoff reports on the production of eggs by *Clonorchis sinensis* in experimentally infected rabbits. Experiments were carried out on two groups of animals. The seven rabbits of the first group were given 300 metacercariae each. The nine animals of the second group received 50 to 1,000 metacercariae each. The surviving animals of the first group were sacrificed and examined after 55 weeks and those of the second group after 16 weeks. Faecal egg counts were made during the observation periods. The number of eggs increased up to the 13th week then showed a cyclic variation with maxima at about 10-week intervals. The average number of eggs per worm per day in the 16th week was about 4,000 and the average number of eggs per gm. faeces per worm was about 100. N.J.

(40h) Thomas describes and figures five monorchiid trematodes from marine sublittoral fish caught off the coast of Ghana. Four of these are new to science and *Lasiotocus longicaecum* from *Lethrinus atlanticus* constitutes a new host and geographical record. *Lasiotocus cynoglossi* n.sp. from *Cynoglossus goreensis* differs from all other species of the genus in having vitelline follicles extending from the acetabular level to the posterior end of the caeca and from all but *L. beauforti* in the unusually long genital atrium; this new species is further subdivided into two subspecies *L. cynoglossi magniovatus* n.subsp. and *L. c. major* n.subsp. from the Accra and Sekondi areas respectively and these subspecies differ in size of the eggs, ratios of the oral and ventral suckers and form of the testis and vitelline glands. *L. chaetodipteri* n.sp. from *Chaetodipterus lippei* closely resembles *L. trifolifer*, *L. bacilliovatus*, *L. longovatus* and *L. lintoni* and although there are several morphological features which, in combination, distinguish it from them the new species may be synonymous with *L. trifolifer*. *Hurleytrema trachinoti* n.sp. from *Trachinotus goreensis* is more closely allied to *H. ovocaudatum* than to the species described by Manter but differs from it in having a larger oral sucker and in the position of the vitelline glands and genital pore. *Diplomonorchoides magnacetabulum* n.g., n.sp. from *Cynoglossus goreensis* may be distinguished from *Paramonorchoides*, the most nearly related genus, in that the testes are intra-caecal, the vitellaria lie more posteriorly and the genital atrium and excretory bladder are much longer. The high degree of host specificity observed and the possible synonymy of *Proctotrema*, *Genolopa*, *Paraproctotrema* and *Proctotrematoides* are discussed. S.W.

(40i) Sogandares-Bernal & Hutton give a description and figures of *Bivesicula tarponis* n.sp. from *Megalops atlanticus* caught off the west coast of Florida. This is the sixth species of the genus to be recorded and it may be distinguished from *B. claviformis*, *B. epinepheli* and



*B. synodi* by the possession of a very long oesophagus and the lack of a pharynx, from *B. clavi-formis*, *B. epinepheli*, *B. hepsetiae* and *B. australis* by possessing vitellaria which extend behind the testis, from all but *B. australis* by the length of the caeca which end behind the testis, from *B. australis* (known only from Tasmania) by the equatorial position of the genital pore and the relatively small oral sucker, and from *B. synodi* by the extent of the vitellaria. The possible life-history and the affinities of the bivesiculids are discussed. S.W.

#### 41—Journal of Tropical Medicine and Hygiene.

- a. WEBBE, G., 1959.—“A Bilharzia and molluscan survey in the Handeni and Korogwe districts of Tanganyika.” **62** (2), 37–42.

(41a) Webbe reports that the urines of 1,061 persons were examined in Handeni district and 428 people in Korogwe district, Tanga Province, Tanganyika. The incidence of infection with *Schistosoma haematobium* was 17.4% in the former and 51.1% in the latter district. The highest incidence of infection in Handeni district was in the 16 to 20-year-old age group; 20.3% of 152 persons of both sexes and 49.6% of 141 males were positive. These figures were compared with those obtained in a coastal area [for abstract see Helm. Abs., **27**, No. 28b]. The pattern of infection in the Korogwe area resembled that in the coastal area. Snail survey revealed the presence of *Bulinus* (*Physopsis*) *globosus*, *B. (P.) nasutus*, *B. (P.) africanus ovoideus*, *B. (Bulinus) tropicus* and *B. (B.) forskalii*. The epidemiology of schistosomiasis haematobia in these areas is discussed. An attempt to infect two hamsters with cercariae obtained from *B. (P.) globosus* was unsuccessful. It is suggested that the cercariae were not of “mammalian” type. N.J.

#### 42—Nature. London.

- a. COTTEN, J., 1959.—“Chromosome number of the potato root eelworm, *Heterodera rostochiensis* Wollenweber.” [Correspondence.] **183** (4654), 128.  
 b. SILVERMAN, P. H., 1959.—“*In vitro* cultivation of the histotrophic stages of *Haemonchus contortus* and *Ostertagia* spp.” [Correspondence.] **183** (4655), 197.  
 c. KABATA, Z., 1959.—“A monogenetic trematode new to the British fauna.” [Correspondence.] **183** (4659), 481.  
 d. SOULSBY, E. J. L., SOMMERVILLE, R. I. & STEWART, D. F., 1959.—“Antigenic stimulus of exsheathing fluid in self-cure of sheep infested with *Haemonchus contortus*.” [Correspondence.] **183** (4660), 553–554.  
 e. MYKYTOWYCZ, R., 1959.—“Effect of infection with myxomatosis virus on the endoparasites of rabbits.” [Correspondence.] **183** (4660), 555–556.  
 f. LAL, M. B., 1959.—“A new leech-infesting cercaria from Duddingston Loch, Edinburgh.” [Correspondence.] **183** (4662), 697–698.  
 g. FEDER, W. A. & DUDDINGTON, C. L., 1959.—“Freeze-drying of *Harposporium anguillulae* Lohde in its nematode host.” **183** (4663), 767–768.  
 h. LLEWELLYN, J., 1959.—“Relationship between *Dictyocotyle* and *Calicotyle*.” [Correspondence.] **183** (4664), 835.  
 i. DAWES, B. & GRIFFITHS, I., 1959.—“Relationship between *Dictyocotyle* and *Calicotyle*.” [Correspondence.] **183** (4664), 835–836.  
 j. WRIGHT, C. A., 1959.—“Generic nomenclature of the intermediate hosts of *Schistosoma mansoni*.” [Correspondence.] **183** (4665), 906–907.  
 k. SHEPHERD, A. M., 1959.—“Testing populations of beet eelworm, *Heterodera schachtii* Schmidt, for resistance-breaking biotypes, using the wild beet (*Beta patellaris* Moq.) as indicator.” [Correspondence.] **183** (4668), 1141–1142.

(42a) Cotten reports the finding of different numbers of chromosomes in the egg of the potato-root eelworm *Heterodera rostochiensis*. The usual number of chromosomes is 18, but eggs having  $2n = 20$  and  $22$  are not uncommon, while eggs with 19, 23 and 24 chromosomes may occur. One fertilized female contained eggs with 47 chromosomes. J.J.H.

(42b) Growth and metamorphosis of *Haemonchus contortus* and *Ostertagia* spp. up to the adult stage in 24 to 30 days occurred in roller tube cultures which contained a medium similar to that utilized by Weinstein & Jones [for abstract see Helm. Abs., **25**, No. 105k] for the culture of *Nippostrongylus muris*. The medium consisted of a mixture of chick embryo

extract, autoclaved sheep liver extract, casein hydrolysate and sheep serum in a 2:2:2:1 ratio. It is suggested that nutrients in fresh liver are subject to considerable variation and may contain a lethal factor. J.E.D.K.

(42c) Kabata records the presence of *Gyrodactylus callariatis* on three *Gadus callarias* caught relatively near to the shore of the east coast of Scotland. This is a new geographical record. The parasites were found on the gills and in the buccal cavity and, in one cod, in the nostrils. It is considered likely that *Gyrodactylus callariatis* is a "childhood" parasite, all the infected cod being less than one year old, and that this may account for the lack of previous records of it in Britain, young fish not normally being examined for parasites. Another species of *Gyrodactylus* occurred on *Gadus merlangus* in the same area. S.W.

(42d) Soulsby *et al.* found that four lines developed when heated *Haemonchus contortus* antigen was tested by the Ouchterlony agar-diffusion technique against serum obtained from a sheep undergoing "self-cure" induced by a dose of larvae of *H. contortus*. The antigenic components which were responsible for the main reactions were identified by cross reactions which occurred between the serum, the heated antigen, exsheathing fluid from infective larvae of *H. contortus* and their metabolic products. The strongest line was produced by the interaction with exsheathing fluid; this was obtained within a week of dosing the sheep with larvae. W.P.R.

(42e) Wild Australian rabbits, naturally infected with *Eimeria* spp., *Graphidium strigosum* and *Trichostrongylus retortaeformis*, were caught when about six weeks old and kept in the laboratory under conditions precluding reinfection. When about five months old they were inoculated with K.M. 13 attenuated strain of the myxomatosis virus; faecal egg and oocyst counts were made at two-day intervals for one week before inoculation and throughout the course of the disease. Statistical analysis of the results showed that there was a significant reduction in the numbers of ova and oocysts seven days after inoculation, which persisted for approximately two weeks—coinciding with the acute stage of the disease. Following this there was a significant increase in the numbers of ova but not of oocysts. In a few animals counts were unchanged and these all survived, whereas all those showing an increase died even when complete recovery from myxomatosis had been expected. Post-mortem examination revealed exceptionally intense infections with *G. strigosum*, the worm populations consisting of newly hatched adults and fourth-stage larvae, in spite of the fact that there had been no reinfection. These results indicate that a mechanism similar to that reported by Michel for *T. retortaeformis* operates with *G. strigosum*. S.W.

(42f) Lal describes a new species of furcocercous cercaria, *Cercaria valvatae* found in *Valvata piscinalis* at the Duddingston Loch, Edinburgh. Of the cercariae previously described in Great Britain *Cercaria* F<sub>1</sub> Harper, 1931, *Cercaria* Y Rees, 1932, *Cercaria micromorpha* Brown, 1926 and *Cercaria pygocystophora* Brown, 1931 most closely resemble the species under consideration but all differ from it in the numbers of flame cells or of penetration glands. As a result of infection experiments the cercaria was found to encyst, as a tetracotyle, in leeches of the species *Helobdella stagnalis*. P.K.

(42g) Agar plate cultures of *Harposporium anguillulae* Lohde, carried in nematodes of the genera *Rhabditis* and *Panagrellus*, were successfully freeze-dried without materially reducing the viability and virulence of the fungus. Disease-free nematodes on agar plates became infected in the presence of the powdered fungus and no morphological changes in the fungus were observed. The powder retained its virulence for periods ranging up to four months from the date of drying. A.M.S.

(42h) Llewellyn does not agree with the opinion expressed by Dawes & Griffiths that *Dictyocotyle coeliaca* is a coelomic form of *Calicotyle kroyeri* [for abstract see Helm. Abs. 27, No. 260b]. There is a characteristic difference in the shape and size of the egg capsules and of the ootypes, confirmed by Llewellyn's own observations on hundreds of capsules from each



of the two parasites and, furthermore, there is a difference in the relationship of the length of the sclerotized penis to the length of the body proper. He also points out that *C. kroyeri* from the cloaca is known to produce egg capsules which yield larvae and discusses the reorganization which would be involved during the life-cycle if these two forms are in fact one and the same. Eventually it may be shown that they belong to the same genus but in the meantime there are no grounds for dissenting from Brinkmann's view that they represent two separate genera. Llewellyn also points out that *Raja radiata* has not previously been recorded at Plymouth  
S.W.

(42i) Dawes & Griffiths reply to Llewellyn's criticism of their note on *Dictyocotyle* and *Calicotyle* [see also preceding abstract and Helm. Abs. 27, No. 26ob]. They cite measurements to show that the difference in size of the eggs is not great and quote from the published descriptions as to the shape of the egg which "defies description and must be greatly influenced by fixation". They are of the opinion that if the extreme mobility of the internal organs of the living trematode is taken into account the differences in the form of the intestine and position of the vaginal pores can be explained, especially as with the loss of the haptor the barrier provided by the opisthaptor and its extrinsic muscles is lost. Coelomic forms attain a larger size because they are in a safer location. If and when the eggs of *Dictyocotyle* are incubated and the emergent larvae reared the relationship between the two forms may be fully elucidated.  
S.W.

(42j) Wright draws attention to the fact that an application has been submitted to the International Commission on Zoological Nomenclature asking for a decision to be given which will stabilize the generic name of the molluscan intermediate hosts of *Schistosoma mansoni*. He points out that it is probable that some time will elapse before the Commission makes known its decision and directs the attention of those who may be concerned with these snails to the normal practice of adhering to the existing nomenclature while an application is before the Commission. Thus, until a decision has been given, the name *Biomphalaria* should be used for the African intermediate hosts and either *Australorbis* or *Tropicorbis* for the South American forms.  
C.W.

(42k) After inoculating pots containing the resistant plant *Beta patellaris* with larvae of beet eelworm, *Heterodera schachtii* Schmidt, from eight different populations, single cysts were recovered from three of the populations, indicating the presence of potential resistance-breaking individuals.  
A.M.S.

### 43—Nematologica.

- a. MULVEY, R. H., 1959.—"Preliminary studies on oogenesis in a cyst-forming nematode, *Heterodera avenae* (Nematoda: Heteroderidae)." 4 (1), 1-2. [German summary p. 2.]
- b. REUVER, I., 1959.—"Untersuchungen über *Paratylenchus amblycephalus* n.sp. (Nematoda, Criconematidae)." 4 (1), 3-15. [English summary p. 14.]

(43a) The behaviour of the chromosomes during meiotic division of the egg of *Heterodera avenae* is described. There are nine pairs of chromosomes ( $2n=18$ ), two polar bodies are formed, and only one sperm was found in each egg.  
J.J.H.

(43b) *Paratylenchus amblycephalus* n.sp. is described and figured from Germany. It is unique in possessing a female spear  $32\mu$  long; in the truncate conical head; and in the presence of numerous males without spears. Reuver observed that there were four larval stages in the male, the last of which has a reduced spear. The nematode attacked roots of apple, *Sorbus aucuparia* and *Cydonia* and experiments showed that eggs were present a week after the roots were attacked, larvae emerging in another week. No differences in either root or shoot length could be attributed to the nematodes but the upper roots of attacked plants tended to form more laterals and their tips were often somewhat thickened. In large populations males sometimes were more frequent than females. The optimum temperatures for attack were between  $16^{\circ}\text{C}$ . and  $21^{\circ}\text{C}$ . Low temperatures in moist soil were inimical to the nematodes but they were relatively resistant to drying of the soil.  
J.B.G.

## 43—Nematologica (cont.)

- c. LUC, M., 1959.—“Nouveaux Criconematidae de la zone intertropicale (Nematoda: Tylenchida).” 4 (1), 16–22. [English summary p. 22.]
- d. HOPPER, B. E., 1959.—“Three new species of the genus *Tylenchorhynchus* (Nematoda: Tylenchida).” 4 (1), 23–30. [German summary p. 29.]
- e. BIRD, A. F., 1959.—“Development of the root-knot nematodes *Meloidogyne javanica* (Treub) and *Meloidogyne hapla* Chitwood in the tomato.” 4 (1), 31–42. [German summary p. 41.]
- f. PEACOCK, F. C., 1959.—“The development of a technique for studying the host/parasite relationship of the root-knot nematode *Meloidogyne incognita* under controlled conditions.” 4 (1), 42–55. [German summary p. 54.]

(43c) Luc describes and figures (females only): *Criconemoides onoense* n.sp. distinguished from *C. curvatum* by the more rectangular body shape, the uninterrupted first annule and the possession of almost twice as many body annules. The species was found attacking the roots of *Ananas sativus* and a slightly different form was associated with banana roots. *Criconemoides ferniae* n.sp. differs from *C. lobatum* in being shorter, the labial lobes being less developed and the first annule being divided into two dorso-ventral parts instead of four plates. It occurred in association with roots of *Ananas sativus*. *Criconema limitaneum* n.sp. is characterized by the crenate edges of each body annule and its name indicates that it occupies a border line position between *Criconema* and *Criconemoides*. It occurred in association with roots of *Cinchona succirubra*. There are brief notes on *Criconemoides curvatum*, *C. citri* (anterior end) and *Hemicriconemoides cocophilus*. All occurred in the Ivory Coast. J.B.G.

(43d) Hopper describes and figures *Tylenchorhynchus acti* n.sp. from Alabama associated with roots of *Hibiscus esculentus*. Only females were found and these differed from *T. capitatus* in having a more off-set lip region, a longer tail with more annules and a characteristic tail tip. *Tylenchorhynchus brevicaudatus* n.sp. (both sexes), associated with roots of *Populus tremuloides* in Utah, differs from *T. magnicauda* in having eight lip annules, spermathecae, adanal phasmid and in the presence of males. *Tylenchorhynchus ewingi* n.sp. (both sexes) attacked roots of *Pinus elliotii* and is differentiated from *T. nudus* and *T. martini* by the possession of spermathecae; and from *T. nudus* by having one more lip annule. The male tail is shorter than that of *T. nudus* and the gubernaculum is different. *T. ewingi* was associated with a decline of seedling *Pinus elliotii* in Louisiana. J.B.G.

(43e) Bird observed the development of *Meloidogyne javanica* and *M. hapla* on tomato and *in vitro*. He confirmed that the third and fourth moults occur within the second cuticle and that the larva is therefore incapable of feeding from the start of the second moult until completion of the fourth. This was from about the 14th to the 19th days after invasion of the root. Statistical analysis of the growth curve for 245 specimens confirms this. The first egg sac appeared on the 27th day and eggs were laid on the 29th. From the 30th until the 40th day egg-laying increased rapidly. The excretory pore and duct and oesophageal gland were carefully observed during development. The position of the pore relative to the median oesophageal bulb changed during moulting but no correlation was observed between the size of the oesophageal gland and the start of moulting. The hypodermis became much thicker before moulting. Development of males from larvae kept in a perfusion chamber was observed and took seven days. The rapid increase in size of larvae from entry of the host until the beginning of moulting, together with the fact that the cuticle does not become thinner during this period, is evidence for the hypothesis that the cuticle is a living structure in a state of metabolic activity. The hypodermis probably has a role in cuticle secretion. M.T.F.

(43f) Peacock cultured *Meloidogyne incognita* in excised tomato roots in a sterile medium. Of nine sterilizing agents tested on egg masses the most suitable was hibitane diacetate (bis [p-chlorophenyldiguanido]-hexane-diacetate). A 15-minute steep in 0.5% solution of this chemical followed a preliminary wash in 0.1% cetavlon (cetyl trimethylammonium bromide). For inoculation, selected roots cultured in White's nutrient medium were removed to a test tube having a thin film of 0.5% nutrient agar on the walls. A sterilized egg mass was placed on the agar close to the root and left for 24 hours. The root was then replaced in fresh



## 43—Nematologica (cont.)

- g. WHITEHEAD, A. G., 1959.—“*Scutellonema clathricaudatum* n.sp. (Hoplolaiminae: Tylenchida), a suspected ectoparasite of the roots of the cotton plant *Gossypium hirsutum* L. var. UK 51.” 4 (1), 56–59. [French summary p. 59.]
- h. DICKINSON, S., 1959.—“The behaviour of larvae of *Heterodera schachtii* on nitrocellulose membranes.” 4 (1), 60–66. [German summary p. 66.]
- i. SEINHORST, J. W., 1959.—“A rapid method for the transfer of nematodes from fixative to anhydrous glycerin.” 4 (1), 67–69. [German summary p. 69.]
- j. WHITEHEAD, A. G., 1959.—“*Nothanguina cecidoplastes* n.comb. syn. *Anguina cecidoplastes* (Goodey, 1934) Filipjev 1936 (Nothotylenchinae: Tylenchida).” 4 (1), 70–75. [French summary p. 75.]

culture solution. Invaded roots showed swellings in 24 to 48 hours and under optimum conditions the larvae completed their life-cycle in 33 days. The attractive part of the root was seen to be a well defined region close behind the apical meristem and usually a large number of larvae entered at the same point. There was no evidence for the existence of a repellent area. It was shown that attraction could occur through a cellophane film which the larvae could not penetrate. Invasion and development of larvae was compared in tomato and *Lycopersicon peruvianum*. The latter retained its resistance to *M. incognita* under the experimental conditions although a few larvae succeeded in completing development. Resistance was shown at all stages of parasitism and larvae developed only where the root became hypertrophied and giant cells developed. Only one female developed in each gall. In 12 of 18 roots there was little or no development and no root swellings. M.T.F.

(43g) *Scutellonema clathricaudatum* n.sp. (female only) is described and figured. It was associated with roots of *Gossypium hirsutum* in Tanganyika. It is characterized by seven head annules and the presence of considerable areolation of all three bands of the lateral field associated with the scutellum (the large phasmid). J.B.G.

(43h) The mechanism of penetration of roots by eelworm larvae was studied by making observations on the behaviour of larvae of *Heterodera schachtii* on wax-free and wax-containing membranes. A significantly greater number of larvae was observed to reach a vertical position on the wax-containing membranes than on the wax-free membranes. Dickinson concludes that attainment of the vertical position means that adhesion to the membrane has occurred and he suggests that attachment of the larva to the root is achieved by suction between the fused lips of the nematode and the root surface. This suction can only occur when the surface is hydrophobic, such as a wax-containing membrane or the suberised surface of a root. Stylet extrusion was observed after adhesion and it is suggested that, in fact, invasion is a response to a purely physical stimulus. H.R.W.

(43i) Seinhorst's method for transferring nematodes from fixative to anhydrous glycerin in 24 hours is carried out in the following stages: Fixed nematodes are placed in a watch glass with 0.5 ml. of a mixture of 20 parts of 96% ethanol, one part glycerin and 79 parts distilled water. The watch glass is then placed in a closed vessel containing an excess of 96% ethanol and kept at 35°C. to 40°C. for at least 12 hours. The watch glass is then filled with a mixture of five parts glycerin in 95 parts of 96% ethanol and is placed in a partly closed petri dish at 40°C. until all the ethanol has evaporated; this should take at least three hours. Nematodes can then be mounted immediately in anhydrous glycerin or kept in a desiccator. Best results are obtained with this method if the nematodes are fixed in an acid fixative. F.A. 4:10 and F.A.A. or a mixture of TAF (four parts) and F.A. 4:10 (one part) are recommended. D.J.H.

(43j) Whitehead transfers *Anguina cecidoplastes* to the new genus *Nothanguina* because of the lack of median oesophageal bulb, and the possession of a hexaradiate head framework. He figures an end-on view of the head and two views of the rather complex spicules. There is no gubernaculum. J.B.G.

## 43—Nematologica (cont.)

- k. RÜHM, W., 1959.—“*Cylindrocorpus* subg.nov. und *Protocylindrocorpus* subg.nov., zwei Untergattungen der Gattung *Cylindrocorpus* Goodey 1939.” 4 (1), 76–82. [English summary p. 82.]
- l. SEINHORST, J. W., 1959.—“Two new species of *Pratylenchus*.” 4 (1), 83–86. [German summary p. 86.]
- m. PERRY, V. G., 1959.—“A note on digonic hermaphroditism in spiral nematodes (*Helicotylenchus* spp.).” 4 (1), 87–88.
- n. GOFFART, H., 1959.—“100 Jahre *Heterodera schachtii*.” 4 (2), 89–90.
- o. ANDERSEN, S., 1959.—“Resistance of barley to various populations of the cereal root eelworm (*Heterodera major*).” 4 (2), 91–98. [German summary p. 98.]
- p. WHITEHEAD, A. G., 1959.—“*Hoplolaimus angustalatus* n.sp. (Hoplolaiminae: Tylenchida).” 4 (2), 99–105. [French summary p. 105.]
- q. KRALL, E., 1959.—“*Bunonema (Rhodolaimus) estonicum* n.sp.—eine faulende Kartoffelknollen bewohnende neue Nematodenart.” 4 (2), 106–109. [English summary p. 109.]

(43k) Rühm makes two subgenera of the genus *Cylindrocorpus* on the basis of the female gonad, namely, *Cylindrocorpus* n.subg. with two ovaries and *Protocylindrocorpus* n.subg. with a single ovary. He describes and figures, from Switzerland, *Cylindrocorpus (Protocylindrocorpus) goodeyi* n.sp. found under the bark of the tree *Ceiba pentandra* where there were slimy conditions. In the male the spicules are very long (up to 120  $\mu$ ), the tail is shortly leptoderan with a slight bursa and there are 10 pairs of caudal papillae. A key to the members of the genus is given.

J.B.G.

(43l) *Pratylenchus convallariae* n.sp. is described and figured from roots of *Convallaria majalis*. The male is indistinguishable from that of *P. penetrans* but the female possesses an irregularly lobed tail tip and incisures extending to the end of the lateral field. Serious root damage can be caused by this species. *Pratylenchus helophilus* n.sp., also described and figured, was found in heavy clay soil on which grass was growing. The males are indistinguishable from those of *P. penetrans* and *P. vulnus* but the females are distinguishable from other species that have three head annules, by the large spermatheca, the long uterus and the relatively pointed tail which is annulated. Both new species occurred in Holland.

J.B.G.

(43m) Perry reports that certain *Helicotylenchus* spp., including *H. nannus*, are digonic hermaphrodites, the sperm and ova being produced in two distinct reproductive organs of the same individual. The spermatozoa originate in a spheroid structure located dorsally from the oviduct near to its junction with the spermatheca. The structure called the “Spermagonium” contains a primordial germ cell which apparently produces a primary spermatocyte by mitosis which then by meiosis becomes four spermatozoa. These move through the oviduct to the spermatheca where they fertilize the oocytes.

D.J.H.

(43n) Goffart gives a brief history of the discovery of and subsequent work on *Heterodera schachtii*, referring mostly to the earlier work.

A.M.S.

(43o) Four years of testing many barley and oat varieties for resistance to the cereal root eelworm, *Heterodera major*, revealed the presence of two biotypes of the eelworm. Biotype No. 1 is non-aggressive and will not produce many cysts on the resistant barley varieties Drost, Alfa and No. 191, while Biotype No. 2 is aggressive and produces cysts on Drost and Alfa in approximately the same numbers as it does on the varieties Herta and Maja which are not resistant to the eelworm.

J.J.H.

(43p) Whitehead describes and figures *Hoplolaimus angustalatus* n.sp. found attacking the roots of banana, *Musa paradisiaca* var. *sapientum* in Tanganyika where it causes lesions as it behaves chiefly as an endoparasite. It differs from *H. proporicus* in the head having four or five annules, of which the lowest three are extensively “tiled”, the body annules are interrupted to form a very narrow lateral field and the gubernaculum is said to have no titillae.

J.B.G.

(43q) *Bunonema (Rhodolaimus) estonicum* n.sp. is described and figured. It differs from *B. (R.) poligraphi* in having more complex tubercles. It was found in rotting potato tubers in Estonia.

J.B.G.



## 43—Nematologica (cont.)

- r. HAGUE, N. G. M., 1959.—“Control of plant parasitic nematodes. I. Susceptibility of potato root eelworms and seed potato tubers to the vapour of sulphur dioxide.” 4 (2), 110–114. [German summary p. 114.]
- s. HAGUE, N. G. M., 1959.—“Control of plant parasitic nematodes. 2. Some aspects of the fumigation of the potato root eelworm, *Heterodera rostochiensis* Woll. with methyl bromide.” 4 (2), 115–121. [French summary p. 121.]
- t. MARTIN, G. C., 1959.—“Plant species attacked by root-knot nematodes (*Meloidogyne* spp.) in the Federation of Rhodesia and Nyasaland.” 4 (2), 122–125.
- u. HESLING, J. J., 1959.—“The emergence of larvae of *Heterodera rostochiensis* Woll. from single cysts.” 4 (2), 126–131. [German summary p. 130.]
- v. MULVEY, R. H., 1959.—“Susceptibilities of plants to the clover cyst nematode, *Heterodera trifolii*, and the period required to complete a life cycle.” 4 (2), 132–135. [German summary p. 135.]
- w. RASKI, D. J. & JOHNSON, R. T., 1959.—“Temperature and activity of the sugar-beet nematode as related to sugar-beet production.” 4 (2), 136–141. [German summary p. 140.]

(43r) Hague confirms that wet cysts of *Heterodera rostochiensis* are more susceptible to sulphur dioxide fumigation than dry cysts. Because of this and the fact that sulphur dioxide is very phytotoxic, at low concentrations, to air-dry seed potatoes, Hague concludes that the fumigation of seed tubers, in the air-dry state (as for delivery) is not a practical proposition.

J.E.P.

(43s) Hague obtained satisfactory dosage-response curves for the methyl bromide fumigation of *Heterodera rostochiensis* cysts. After fumigation, the larval emergence, in a root-diffusate assay has been shown to decrease as the time between treatment and assay is increased. Naturally raised cysts were shown to be more susceptible to methyl bromide than pot-raised cysts and spring cysts were more susceptible than autumn ones. Low doses of methyl bromide appear to have stimulated emergence.

J.E.P.

(43t) This is a supplementary root-knot host list to that given by Martin, 1958 [for abstract see Helm. Abs., 27, No. 262j]. Over 100 plant species and varieties from Rhodesia and Nyasaland are recorded as hosts for *Meloidogyne javanica*, *M. arenaria* or *M. incognita* var. *acrita*. For each record the number of plants examined and the number of sites from which they were obtained are given. The degree of root galling and the number of egg masses in relation to the galling are also indicated.

D.J.H.

(43u) An investigation of the individual egg content and hatching of 50 new cysts picked from four size grades (selected by sieving) showed that there was no linear relationship between egg content and size of cyst in *Heterodera rostochiensis*. Grading cysts reduced the variability of their egg content, but hatching variability was reduced only in the case of cysts of the size range 0.556–0.401 mm.; over 65% of cysts in this range had a hatch of over 80%. J.J.H.

(43v) Mulvey tested 17 species of cultivated and weed plants of Canada as hosts of the clover cyst nematode *Heterodera trifolii*. Garden peas (*Pisum sativum*), and garden beans (*Phaseolus vulgaris*) were efficient hosts but red clover (*Trifolium pratense*) was not. The nematode reproduced on *Chenopodium glaucum*. At least nine generations of the nematode may be produced in one year under green-house conditions.

J.J.H.

(43w) Larvae of the beet eelworm were inoculated into pots containing sugar-beet under controlled temperature conditions. By counting the number of white cysts on the roots only, it was concluded that the optimal temperature range for beet eelworm larvae was 70°F. to 80°F. Sugar-beet were grown for 50 days and in some experiments the number of white cysts on the roots was about twice the number of larvae originally introduced. Raski estimates that as many white females were in the soil as in the roots so the nematode counts are probably as much as 50% below actual populations. It is suggested that increased yields of sugar-beet may be obtained by sowing at an early date, so that the beet plant can become well established before soil temperatures rise to a level where the beet eelworm becomes most active.

H.R.W.

**43—Nematologica (cont.)**

- x. SALENTINY, T., 1959.—“Durch die Rübenrasse des Stockälchens *Ditylenchus dipsaci* hervorgerufene Schadbilder bei einigen Unkrautarten.” 4 (2), 142–146. [English summary p. 146.]
- y. MULVEY, R. H., 1959.—“Investigations on the clover cyst nematode, *Heterodera trifolii* (Nematoda: Heteroderidae).” 4 (2), 147–156. [German summary pp. 155–156.]
- z. GOODEY, J. B., 1959.—“The excretory system of *Paraphelenchus* and the identity of the hemizonid.” 4 (2), 157–159. [German summary p. 159.]

(43x) Salentiny comments upon the damage done on various weeds by a race of *Ditylenchus dipsaci* from sugar-beet. He figures some of the damage. [Fig. 3 appears to be a crucifer *Thlaspi arvense* not *Anagallis arvensis*.] He divides the symptoms into four categories, viz., (i) tissue splitting and shoot malformation—*Aethusa cynapium*, *Avena fatua*, *Polygonum convolvulus*, *P. persicaria* and *Sonchus arvensis*; (ii) considerable distortion without noticeable lesions—*Anagallis arvensis*, *Convolvulus arvensis*, *Mercurialis annua*, *Sinapis arvensis* and *Thlaspi arvense*; (iii) swellings—*Atriplex patula*, *Chenopodium album*, *Galium aparine*, *Plantago major* and *Polygonum aviculare*; (iv) slight swellings—*Galeopsis tetrahit*, *Lepidium draba*, *Melandrium noctuiflorum*, *Papaver rhoeas*, *Ranunculus arvensis*, *Senecio vulgaris* and *Stellaria media*.  
J.B.G.

(43y) This paper describes the embryology and development of *Heterodera trifolii* from larva to adult on white Dutch clover. The first-stage larva moults within the egg and has three further moults within the plant root. At 60°F. the second moult occurs five to six days after the larva has entered the root, the third moult after 17 days and the fourth moult after 26 days. Eggs first appear after 29 days and the females are full of eggs after 43 days. The cysts require about 60 days to turn yellow, and the first brown cysts were found 64 days after the larvae entered the roots. There is a detailed description of the development and anatomy of the cyst vulval cone.  
J.J.H.

(43z) The excretory system of *Paraphelenchus* is shown to consist of an anterior and posterior tubule in the right lateral chord, joining together to form a common excretory duct with which is associated a ventral cell. The hemizonid is a ventro-lateral commissure of the nervous system.  
J.B.G.

**44—New Zealand Journal of Agriculture.**

- a. GEMMELL, M. A., 1959.—“Research Unit assessment of hydatid control problems.” 98 (2), 161, 163, 165.
- b. ANON., 1959.—“Parasitic worms in poultry.” 98 (4), 343, 345–346.
- c. GILL, R. G., 1959.—“Good dog housing: a step in hydatid control.” 98 (4), 385.

(44a) Only recently has public interest in New Zealand been sufficiently roused to fully back eradication of hydatidosis. The source of this infection to man and sheep and *Multiceps* to sheep are dogs infected with *Echinococcus granulosus* and *Taenia hydatigena*; these tapeworms are the major cause of condemnation of sheep livers in the country. On farms in the South Island, one in three dogs was infected where the dogs had access to raw offal and one in 18 where attempts were being made to prevent this. Dogs employed in abattoirs and freezing works were similarly infected. Future control, therefore, composed chiefly of preventing dogs from eating raw offal and of their treatment by trained men, will be directed at these two groups.  
G.I.P.

(44b) Instructions are given concerning prophylaxis and therapy of parasitic worms in poultry.  
N.J.

**45—New Zealand Veterinary Journal.**

- a. GEMMELL, M. A., 1959.—“Coenurosis in New Zealand.” [Correspondence.] 7 (1), 30.

(45a) *Multiceps multiceps* infection is reported from the dog and sheep in mid-Canterbury. All previous New Zealand records in sheep had been from Canterbury and as the last one is



dated 1946, it had been suggested that the parasite had failed to survive. However, from inquiries among veterinarians in the district it appears that two cases are diagnosed post-mortem each year.

G.I.P.

#### 46—Occasional Paper. Mauritius Sugar Industry Research Institute.

- a. WILLIAMS, J. R., 1959.—“Studies on the nematode soil fauna of sugar cane fields in Mauritius. 3. Dorylaimidae (Dorylaimoidea, Enoplida).” No. 3, 28 pp.

(46a) Williams records and figures 29 species, including seven new species which he describes, of Dorylaimidae from sugar-cane fields in Mauritius. In the Longidorinae he found *Xiphinema ensiculiferum*, *X. pratense* and *Longidorus laeviscapitatus* n.sp., (female) characterized by its small size and its smoothly rounded head which is not offset from the body. In the Nygolaiminae he found *Nygolaimus brachyurus*, *N. vulgaris* and *Sectonema ventralis* and, in the Actinolaiminae, *Actinolaimus elaboratus*. In the Dorylaiminae 23 species were recorded: *Chrysonema mauritiana* n.sp. (female) has a single posterior ovary allying it to *C. abyssinica* but it differs in size and has a shorter, blunter tail; *Discolaimus major*; *D. bulbiferus*; *Labronema pacificum*; *L. hyalinum*; *L. mauritiense* n.sp. (both sexes) differs from *L. octodurensis* in the massive spear and the male supplements beginning at the level of the spicule heads; *L. parvum* n.sp. (male) is distinguished by having a rudimentary anterior gonad of variable size; *Aporcelaimus spiralis*; *A. (?) conicaudatus*; *A. mamillatus* n.sp. (both sexes) is distinguished by the mamillate tail; *Dorylaimus filicaudatus*; *D. flagellatus* n.sp. (female) is distinguished by its small size, transverse vulva and very long whip-like tail with a slender articulated core; *D. (?) acris*; *D. sylphoides* n.sp. (female) is distinguished by the lip region, very long tail, longitudinal vulva with cuticularized labia and single posterior ovary; *D. humilis*; *D. (?) opisthohystera*; *D. carteri*; *D. bastiani*; *D. biroi*; *D. granuliferus*; two other unidentified species of *Dorylaimus*, one of which was closely related to *D. acuticauda*, were recovered. Williams makes an important comment on the nature of the mouth of the tubular sheath surrounding the spear in dorylaims and on which *Dorylaimus* and *Aporcelaimus* are separated.

J.B.G.

#### 47—Parasitology.

- a. SILVERMAN, P. H. & CAMPBELL, J. A., 1959.—“Studies on parasitic worms of sheep in Scotland. I. Embryonic and larval development of *Haemonchus contortus* at constant conditions.” 49 (1/2), 23–38.
- b. WILLIAMS, H. H., 1959.—“The anatomy of *Köllikeria filicollis* (Rudolphi, 1819), Cobbold, 1860 (Trematoda: Digenea) showing that the sexes are not entirely separate as hitherto believed.” 49 (1/2), 39–53.
- c. WILLIAMS, H. H., 1959.—“The anatomy of *Phyllobothrium sinuosiceps* sp.nov. (Cestoda: Tetraphyllidae) from *Hexanchus griseus* (Gmelin) the six gilled shark.” 49 (1/2), 54–69.
- d. WELCH, H. E., 1959.—“Taxonomy, life cycle, development, and habits of two new species of Allantonematidae (Nematoda) parasitic in drosophilid flies.” 49 (1/2), 83–103.
- e. PEARSON, J. C., 1959.—“*Neodiplostomum intermedium* n.sp. from the allied rat, *Rattus assimilis*, with remarks on the genera *Neodiplostomum* and *Fibricola* (Trematoda: Diplostomatidae).” 49 (1/2), 111–120.
- f. GRAINGER, J. N. R., 1959.—“The identity of the larval nematodes found in the body muscles of the cod (*Gadus callarias* L.).” 49 (1/2), 121–131.
- g. FRANKLAND, H. M. T., 1959.—“The incidence and distribution in Britain of the trematodes of *Talpa europaea*.” 49 (1/2), 132–142.
- h. JAIN, S. L., 1959.—“Monogenea of Indian freshwater fishes. VIII. *Sprostonia*, a new genus of freshwater Tetraonchinae, with the descriptions of four new species, from the gill filaments of fishes, from Lucknow.” 49 (1/2), 153–168.
- i. KENDALL, S. B., 1959.—“The occurrence of *Histomonas meleagridis* in *Heterakis gallinae*.” 49 (1/2), 169–172.
- j. ERASMUS, D. A., 1959.—“The migration of *Cercaria* X Baylis (Strigeida) within the fish intermediate host.” 49 (1/2), 173–190.
- k. REES, G., 1959.—“*Ditrachybothridium macrocephalum* gen.nov., sp.nov., a cestode from some elasmobranch fishes.” 49 (1/2), 191–209.

(47a) Eggs of *Haemonchus contortus* were cultured in moist, unbroken faecal pellets contained in covered 1 lb. jam jars. Constant temperatures of 37°, 21·7°, 14·4°, 7·2° and 0°C.

were maintained during the period of embryonation and development. Development was uneven and discontinuous and mortality from unknown causes also occurred. Third-stage larvae appeared in five days at 21.7°C., nine days at 14.4°C. and at least 15 days at 11°C. Some development was observed at a temperature of 7.2°C. The proportion of eggs surviving to the pre-hatch stage varied from 10% to 90% with maximum survival at 11° and 14.4°C. Embryonation rendered the eggs more resistant to adverse conditions and survival up to four months was recorded at 7.2°C. In the determination of temperature effect on water-saturated cultures it was found that development was inhibited. Rapid desiccation of faecal pellets destroyed all but advanced embryos. Eggs in the pre-hatch stage remained viable for up to six weeks in a dry state. Silverman & Campbell conclude that eggs of *H. contortus* require about two weeks in summer, and considerably longer during cooler seasons, for development to the third-stage larva. Preliminary studies on eggs of *Ostertagia* spp., *Trichostrongylus* spp. and *Oesophagostomum venulosum* indicate that the developmental cycle is more prolonged and that they are better able to endure adverse conditions. J.E.D.K.

(47b) Williams has made a thorough investigation of the anatomy of *Köllikeria filicollis* and gives a detailed and illustrated redescription. Four elliptical orange-yellow cysts from the epithelium inside the operculum of *Brama raii* yielded a total of four functional females and thirteen functional males, one female and one to five males being found per cyst. The sexes are not, as hitherto believed, entirely separate, although markedly dimorphic; each sex contains rudiments of the genitalia of the other. The cyst is a reaction of the host's tissue to secretions of some of the subcuticular cells of the functional female; the structure of the cyst and that of the body wall is described and compared with that found in other trematodes. There are slight differences in the alimentary canal in the "males" and "females", the caeca in the female not extending far into the hind-body, being straight and having club-shaped ends. The excretory system is Y-shaped in both but no trace was found in the hind-body of the female. The nervous system, which has not been described previously, is composed of a "brain", situated dorsally to the oesophagus and made up of two ganglia joined by a transverse commissure; each ganglion gives off three nerves anteriorly and two posteriorly. There is a single, much convoluted testis in the posterior half of the body; the vas deferens runs forward to open into a very shallow genital atrium; there is no cirrus. The ovary is situated in the hind-body and is elongated, slender and convoluted; the oviduct receives the duct of the receptaculum seminis and the yolk duct before opening into the central chamber which is surrounded by Mehlis' gland cells; the uterus is first thin-walled and coiled and near the anterior end of the hind-body becomes thick-walled and muscular, possibly functioning as a pumping mechanism necessitated by the extreme length of the uterus and enormous number of eggs produced; in the fore-body it is thin-walled and runs straight to the genital atrium. There is evidence that the egg-shell is formed in the same way as described by Stephenson in *Fasciola hepatica*. The systematic position is discussed and a new diagnosis of the species is given. S.W.

(47c) *Phyllobothrium sinuosiceps* n.sp. from *Hexanchus griseus* differs from *P. lactuca* and *P. radioductum* in that it lacks four well defined bothridia, in the number of testes and in host distribution. The species is compared with *P. dohrnii* as descriptions of other members of the genus *Phyllobothrium* are inadequate. The external features, the excretory, nervous and genital systems of *P. sinuosiceps* are described in detail, particular attention being given to the genitalia. An account of the female system includes a brief discussion of fertilization in the Cestoda. Williams states that the simple arrangement of the nervous and excretory systems, the specialized features of the genitalia and host distribution suggest that *P. sinuosiceps* may be one of the most primitive species belonging to the Phyllobothriidae. H.H.W.

(47d) *Howardula aoronymphium* n.sp. and *Parasitylenchus diplogenus* n.sp. are described and figured. The former occurred in the abdominal haemocoel of *Drosophila phalerata* and *D. kuntzei* at Harpenden, England, and the latter in the same situation in *D. subobscura*, *D. obscura* and *D. silvestris* at Harpenden and Dalkeith, Scotland. *H. aoronymphium* shows



ovoviviparity; the body is C-shaped, 1.5–3 mm. long; gravid females are without visible anus or vulva; bursa and gubernaculum absent in male; tails of females and immature females similar to but longer than those of *H. oscinellae* (T. Goodey, 1930) Wachek, 1955. *P. diplogenus* lays unsegmented eggs; it is smaller in all generations than either *P. dispar* or *P. curvidentis*; male without gubernaculum; spear a simple pointed tip; vulva clearly visible in both generations of female; free-living stages smaller than parasitic. There are full descriptions of the various stages and the life-cycles, and sections on incidence of parasitism, host-parasite relationships and specificity of parasitism. The genus *Parasitylenchus* Micoletzky, 1922 is discussed and restricted to three species, viz., *P. dispar* (Fuchs, 1914) Micoletzky, 1922, *P. curvidentis* (Fuchs, 1914) Micoletzky, 1922, for which a full synonymy is given, and *P. diplogenus*.  
J.B.G.

(47e) Pearson describes and figures *Neodiplostomum intermedium* n.sp. from *Rattus assimilis*; it is differentiated from other species of the genus by the following combination of characters: there is no genital cone, the vitellaria form two ventro-lateral bands in the hind-body without terminal masses, and the anterior testis is nearly symmetrical and is as wide as the posterior testis. *N. intermedium* shows affinities with other species of this genus and with the species of *Fibricola* and the relationships and generic determinations are discussed. It is concluded that *Fibricola* should become a subgenus of *Neodiplostomum* and the generic diagnosis is emended accordingly. The subfamily Alariinae consequently falls as a synonym of Diplostominae.  
S.W.

(47f) Grainger raised the larval nematodes found in the body musculature of Icelandic cod to the pre-adult stage and established that they belong to the genera *Porrocaecum* (*Ter-ranova*)—probably *P. decipiens*—and *Anisakis*. The larvae and pre-adults are described. The conditions for development from the moult to the pre-adult stage are a fairly high temperature (37°C.) and the presence of pieces of fish for 24 hours about the beginning of culturing. 1% pepsin assists development but is not essential. Attempts to infect rats, kittens and pigeons were not successful.  
W.G.I.

(47g) In this survey of the trematodes of *Talpa europaea* from Suffolk, Cheshire-Staffordshire, Westmorland-Yorkshire and south-west Scotland, with a single record from Oxford, Frankland records *Ityogonimus lorum* from all areas, *I. ocreatus* from Suffolk and *Omphalometra flexuosa* from Suffolk and Cheshire-Yorkshire. Mixed infections were rare and although *O. flexuosa* was found with both species of *Ityogonimus*, *I. ocreatus* and *I. lorum* were never found together. No seasonal variation in incidence was observed and the sex of the host had no effect on the parasitism. Premunition did not apparently occur and the presence of flukes did not affect other intestinal helminths. *I. lorum* was found almost exclusively in the lower half of the intestine whereas *I. ocreatus* and *O. flexuosa* occurred in the upper half. Geographical distribution was patchy. The paper is illustrated by ten tables.  
S.W.

(47h) Jain erects *Sprostonia* n.g., for four new members of the Tetraonchinae found on fresh-water fish from Lucknow. The new genus is distinguished from allied genera by the two-piece shape of the ventral bar, the firm articulation of the cirrus and accessory piece at the base and the presence of a dextral vagina. *S. indica* n.sp. (genotype) was recovered from the gills of *Europiichthys vacha*, *S. wallagonia* n.sp. from *Wallagonia attu*, *S. gomtia* n.sp. from *E. vacha* and *S. asiatica* n.sp. from *Callichrous pabda*. Drawings and descriptions of all four are given and they are differentiated from one another by the presence or absence of a central onchium in the haptor, the presence or absence of projections on the ventral anchor shafts, the shape of the dorsal anchor bases, and the structure of the cirrus and accessory piece.  
S.W.

(47i) Kendall records, for the first time, the presence of *Histomonas meleagridis* in a larva of *Heterakis gallinae*. The parasites were smaller than those normally seen in tissue but in other respects were identical and showed the same staining reactions.  
S.W.

(47i) Erasmus describes the penetration of *Cercaria X* Baylis from *Lymnaea stagnalis* into *Gasterosteus aculeatus*, the three-spined stickleback, and its subsequent migration through the tissues to the lens of the eye. The pathology of penetration and migration is also discussed. The author suggests that (i) tissue penetration is achieved mainly by means of the anterior spines, the secretion of the penetration glands being lubricatory and/or adhesive rather than lytic, and (ii) the restricted tissue distribution during migration and the unimodal distribution of the cercariae along the length of the body indicate that their final localization in the lens of the eye is not achieved by chance. P.K.

(47k) Rees states that *Ditrachybothridium macrocephalum* n.g., n.sp. from *Raja fullonica*, *R. circularis* and *Scyliorhinus caniculus* is a cestode which does not fit precisely into any existing order. A detailed description of the scolex and strobila includes an account of the musculature, nervous, excretory and reproductive systems. The systematic position of *D. macrocephalum* is discussed and the species compared with members of the genus *Echinobothrium*. It differs from *Echinobothrium* in that the cephalic peduncle is unarmed and the apex of the scolex lacks two groups of prominent spines. The general arrangement of the genitalia resembles that of *Echeneibothrium*. H.H.W.

#### 48—Phytopathology.

- a. AYCOCK, R., 1959.—“Relation of fungicidal and nematocidal bulb treatments to phytotoxicity and control of basal rot in narcissus.” 49 (1), 12–16.
- b. DROPKIN, V. H., 1959.—“Varietal response of soybeans to *Meloidogyne*—a bioassay system for separating races of root-knot nematodes.” 49 (1), 18–23.
- c. TOLMSOFF, W. J., 1959.—“The isolation of nematode trapping fungi from Oregon soils.” [Abstract of paper presented at the 1958 Meeting of the Pacific Division, American Phytopathological Society, Logan, Utah, June 18–19, 1958.] 49 (2), 113–114.

(48a) Aycock describes the use of fungicides, particularly Dowicide B, for the control of *Fusarium oxysporum*, the basal rot of narcissi. As the narcissi producing areas of North Carolina are infected with soya bean cyst nematodes, these treatments are used to kill cysts adhering to the bulbs to comply with quarantine measures, although the nematode is not parasitic on narcissi. J.E.P.

(48b) Dropkin investigated host-parasite relationships in nine inbred lines of *Zea mays*, ten lines of *Avena* sp. and 19 varieties of *Glycine max* inoculated with four or five of the following root-knot nematodes—*Meloidogyne arenaria*, *M. arenaria* subsp. *thamesi*, *M. incognita*, *M. incognita* var. *acrita* and *M. hapla*. The degree of galling, egg mass production, histology of the galls and nematode sex ratios were compared. The various lines of *Zea* behaved differently both within the lines to the different nematode species and between the lines to each separate species. In oats the galls were small and hard to estimate. Soya beans were most suitable for bioassay and the varieties differed both in degree of galling and in egg mass production when exposed to any one species of nematode. The effects of the different nematode species on a single variety of soya bean were also varied. Egg mass production and number of males were independent of gall size. Sex ratios varied with different combinations of host and parasite. There was a correlation between giant cell structure and egg mass production. Two populations of *M. incognita* var. *acrita* could be distinguished by their different behaviour on soya beans. M.T.F.

(48c) *Arthrobotrys superba* and *Dactylaria* sp. were recovered from soil from several areas in Oregon, and were isolated readily from soil plated on milk agar but seldom appeared when the same soil was plated on PDA. Optimum temperature for growth and trap formation was 25°C. A.M.S.



## 48—Phytopathology (cont.)

- d. NIELSEN, L. W. & SASSER, J. N., 1959.—“Control of root-knot nematodes affecting Porto Rico sweetpotatoes.” **49** (3), 135–140.
- e. TODD, E. H. & ATKINS, J. G., 1959.—“White tip disease of rice. II. Seed treatment studies.” **49** (4), 184–188.
- f. ATKINS, J. G. & TODD, E. H., 1959.—“White tip disease of rice. III. Yield tests and varietal resistance.” **49** (4), 189–191.
- †g. BARKER, K. R., 1959.—“Studies on the biology of the stem nematode.” **49** (5), 315.
- †h. COOPER, W. E., WELLS, J. C. & SASSER, J. N., 1959.—“Sting nematode control on four crops with pre- and post-plant applications of Nemagon.” **49** (5), 316.

(48d) Nielsen & Sasser review the problem of root-cracking in sweet-potatoes grown in North Carolina. This damage is attributed to the root-knot nematode *Meloidogyne incognita* var. *acrita*. Both D-D and EDB were effective in reducing nematode attack and increasing yields and root quality. Detailed interactions of soil types and dosage rate with yields are described from replicated experiments on sand, sandy loam and loam soils. Nematicides applied on a vermiculite carrier were shown to be more effective than liquid applications. Nematode densities generally increased following the initial reduction by soil treatment but evidently the greatest damage to the sweet-potato occurs early in the growing season. J.E.P.

(48e) Todd & Atkins treated rice seed for the control of *Aphelenchoides besseyi* by means of warm water, by methyl bromide fumigation and with a series of chemicals. After pre-soaking the seed for 24 hrs. in cool water, 15 mins. at 51–53°C. proved nematocidal and not phytotoxic. Without pre-soaking good results were obtained with 10 and 15 mins. at 55–61°C. Methyl bromide fumigation was not satisfactory. Of 55 chemicals used as dusts or slurries three experimental rhodanine compounds were satisfactory, namely, N-168 (3-methyl-5-ethyl rhodanine, 10%), N-244 (3-*p*-chlorophenyl-5-methyl rhodanine, 10%), and N-245 (3-*p*-chlorophenyl-5-ethyl rhodanine, 10%). In field tests N-244 at 4 oz. per bushell of seed proved effective, but the same chemical as a commercial product was not satisfactory. The warm-water treatment is considered the most reliable for small lots of seed. M.T.F.

(48f) In 1954 nematode-free seed of 15 varieties of rice was sown in plots, half of which were later inoculated with *Aphelenchoides besseyi* and half uninoculated. The varieties were rated visually for severity of white tip disease before heading and at harvest the yields were weighed. Reductions in yields from inoculated as compared with uninoculated plots were from 17–54% in the susceptible varieties and from 0–24% in the resistant. In 1955 and 1956 when white tip was only moderately severe the yield reductions averaged 4.9% and 6.6% in susceptible and 1.5% and 1.8% in resistant varieties. Twenty-eight rice varieties grown in infested nurseries were classified for their resistance to white tip disease in three seasons; seed from resistant varieties was very rarely found to carry nematodes. M.T.F.

(48g) Barker inoculated 36 plant species and varieties with two populations of the lucerne race of *Ditylenchus dipsaci*. Both populations readily reproduced on some lucerne varieties, on bean and soya bean. Slight reproduction occurred on some other plants. One population reproduced on Wando garden pea but the other did not. A lucerne population of *D. dipsaci* was compared with a teasel strain on nine plant species. The teasel strain was generally larger than the lucerne strain. Temperature and moisture effected the rate of nematode infection and reproduction. D.J.H.

(48h) Cooper *et al.* compared the effectiveness of Nemagon granules (17.3% technical dibromochloropropane) applied two weeks before planting and one or two months after planting of cotton, maize, peanuts or soya beans for the control of *Belonolaimus gracilis*. In replicated experiments rates of application tested were equivalent to 0.0, 0.5, 1.0 and

†Abstract of paper presented at the 1959 Annual Meeting of the Southern Division, American Phytopathological Society, Memphis, Tenn., Feb. 2–4, 1959.

## 48—Phytopathology (cont.)

- †i. ENDO, B. Y., 1959.—“Response of root-lesion nematodes, *Pratylenchus brachyurus* and *P. zeae*, to various host plants and soil types.” 49 (5), 316.
- †j. GOOD, J. M. & STEELE, A. E., 1959.—“Evaluation of methods for applying 1,2-dibromo-3-chloropropane for controlling root-lesion nematodes on Spanish peanuts.” 49 (5), 317.
- †k. HAMBLÉN, M. L. & SLACK, D. A., 1959.—“Factors influencing the emergence of larvae from cysts of *Heterodera glycines* Ichinohe. Cyst development, condition, and variability.” 49 (5), 317.
- †l. HARE, W. W., 1959.—“Resistance to root-knot nematodes in cowpea.” 49 (5), 318.

1.5 [U.S.] gal. per acre technical fumigant, applied in single row plots. Pre-planting fumigation at 1.0 and 1.5 [U.S.] gal. per acre gave the highest cotton yields—by the time of the post-planting application, most of the cotton seeds had been killed by the sting nematodes. Maize yields increased most after 1.0 [U.S.] gal. per acre pre-planting treatment. Post-planting treatment of maize gave no yield increase. All pre-planting treatments of peanuts and soya beans increased yields; post-planting treatments, particularly the one-month application, also increased yields. The authors conclude that pre-planting application is superior and that control is correlated with dosage and crop performance. J.E.P.

(48i) Endo classified a number of plant species and varieties as very favourable, favourable and non-favourable hosts for *Pratylenchus brachyurus* and *P. zeae*. Large populations of *P. brachyurus* developed on maize and peanuts over a period of five months, but very small populations were recovered from oats and *Crotalaria* at the end of the same period. Sandy loam from Norfolk [U.S.A.] proved to be most suitable for nematode invasion of host plants and population increase; loam from Portsmouth [U.S.A.] was somewhat less suitable and clay-loam from Cecil was least suitable. The same soil types, devoid of plants, or in which favourable hosts were growing were tested for suitability for migration by the root-lesion nematodes. Little or no distance was travelled by these nematodes in soils devoid of host plants, but where maize was grown the nematode travelled up to five inches in four months in the Norfolk sandy loam, rather less in the Portsmouth loam and the shortest distances were covered in Cecil clay-loam. C.C.D.

(48j) Good & Steele found that dibromochloropropane (DBCP) gave satisfactory control of *Pratylenchus brachyurus*, greatly reduced pod and peg rot and increased yield of peanuts. Pre-planting row application at 0.5 [U.S.] gal. per acre was superior to either post-planting side dressing or pre-planting broadcast application of DBCP granules. J.E.P.

(48k) Moisture stress on soya bean plants resulted in a greater emergence of larvae from brown cysts, which were also present in a higher proportion. Adequate or excessive soil moisture resulted in a high percentage of white or yellow cysts and less emergence of larvae from brown cysts recovered from soil. The degree of cyst maturity and condition of the brown cysts influenced the number of larvae that emerged; there was considerable variability in the emergence from single cysts. J.J.H.

(48l) Young plants of Iron cowpea and breeding lines M255, M455, M755 and M855 were tested in the green-house and found resistant to *Meloidogyne incognita*, *M. incognita* var. *acrita*, *M. javanica* and *M. arenaria*. No galls were formed by the last but the other three species formed small galls. Nine commercial cowpeas were susceptible. Of 80 F<sub>3</sub> progenies of M455 × Brown Sugar Crowder (susceptible) 18 were resistant, 38 segregating and 24 susceptible to *M. incognita*. Resistance to this species seems to be controlled by a single gene pair with resistance dominant. M.T.F.

†Abstract of paper presented at the 1959 Annual Meeting of the Southern Division, American Phytopathological Society, Memphis, Tenn., Feb. 2-4, 1959.



## 48—Phytopathology (cont.)

- †m. ROSS, J. P., 1959.—“Influence of resistance to *Heterodera glycines* on soybean yield and nematode populations.” **49** (5), 319.
- †n. SASSER, J. N. & McLAUGHLIN, F. W., 1959.—“The influence of root-knot-nematode-infected seed pieces and infested soil on potato production.” **49** (5), 319.
- †o. SLACK, D. A. & HAMBLE, M. L., 1959.—“Factors influencing emergence of larvae from cysts of *Heterodera glycines* Ichinohe. Influence of constant temperature.” **49** (5), 319-320.
- p. CHAPMAN, R. A., 1959.—“Development of *Pratylenchus penetrans* and *Tylenchorhynchus martini* on red clover and alfalfa.” **49** (6), 357-359.
- q. DuCHARME, E. P., 1959.—“Morphogenesis and histopathology of lesions induced on citrus roots by *Radopholus similis*.” **49** (6), 388-395.

(48m) The soya bean cyst nematode, *Heterodera glycines* will not reproduce on the roots of the soya bean variety “Peking”. “Peking”, and a susceptible variety of soya bean, were planted in untreated soil and in soil treated with Nemagon broadcast at a rate of 3 gallons per acre; in this way the influence of the resistance of “Peking” on yield and nematode population could be determined. The respective yields of susceptible and resistant plants in untreated plots was 37% and 60% of the yields of soya beans grown in treated plots. Root nodules were abundant on “Peking” one month after planting in untreated soil, while the susceptible soya bean had few nodules. There was a correlation between the nematode population density and soya bean yield in the susceptible line; after maturity the average population in untreated plots was three larvae per pint of soil for “Peking” and 320 larvae per pint for the susceptible soya bean.

J.J.H.

(48n) Seed potatoes of three categories, (i) infested with *Meloidogyne incognita*, (ii) symptomless but from a root-knot infested crop and (iii) certified, were planted in untreated soil and in soil treated with D-D broadcast at 20 gal. per acre. Yields showed that seed quality was of little importance when potatoes were planted in infested soil. Both selected and obviously infested tubers increased soil infestation and decreased quality and yield.

M.T.F.

(48o) Batches of 50 cysts of *Heterodera glycines* were incubated in water at temperatures ranging from 0°C. to 44°C., with intervals of 4°C. Below 16°C. and above 36°C. there was no larval emergence. Emergence increased with increase in temperature to a maximum at 24°C., there was then a decrease of emergence to 36°C. Pre-treatment of cysts at temperatures of 12°C. or below for one month reduced the hatch but one week's low temperature treatment did not affect the hatch. Pre-treatment of cysts at 40°C. for one week greatly reduced the hatch, 40°C. for ten days or over prevented hatching. Emerged larvae were killed by freezing and by incubation at 40°C. for three hours, but some persisted for over 30 days at temperatures of between 4°C. and 28°C.

J.J.H.

(48p) Chapman collected *Pratylenchus penetrans* and *Tylenchorhynchus martini* from a red clover field and reared colonies on *Zea mays* L. and sorghum (*Holcus* sp.) respectively. Nematodes from these two reared populations were then added to pots of Kenland red clover (*Trifolium pratense*) and Atlantic lucerne (*Medicago sativa*). *P. penetrans* either alone or in combination with *T. martini* significantly reduced the growth of red clover and lucerne. *T. martini* readily reproduced on red clover but poorly on lucerne and had no adverse effect on the growth of either plant. A 1:1 combination of the nematodes had the same effect on the plants as *P. penetrans* alone. *T. martini* in the presence of *P. penetrans* only increased 10-25% as much as it did when alone but *P. penetrans* increased as well in the presence of *T. martini* as it did alone.

D.J.H.

(48q) DuCharme describes the penetration of citrus roots by burrowing nematodes and the changes that occur in the internal morphology of parasitized roots in gnotobiotic cultures. These changes are illustrated by photographs of sections of parasitized roots. The nematodes invade actively growing root tips and feed by lysis of successive cells forming tunnels and

†Abstract of paper presented at the 1959 Annual Meeting of the Southern Division, American Phytopathological Society, Memphis, Tenn., Feb. 2-4, 1959.

cavities in the cortex and stele and often the phloem-cambium ring is virtually destroyed. Hyperplasia and pericycle tumour formation occurred, the nematodes also feeding on the tumours. [This is a more detailed account than that given by DuCharme in 1957 in *Proc. Fla hort. Soc.*, **70**, 58-60.] D.J.H.

#### 49—Plant Disease Reporter.

- a. GASKIN, T. A., 1959.—“Abnormalities of grass roots and their relationship to root knot nematodes.” **43** (1), 25-26.
- b. SCHUSTER, M. L., 1959.—“Relation of root-knot nematodes and irrigation water to the incidence and dissemination of bacterial wilt of bean.” **43** (1), 27-32.
- c. HOLLIS, J. P., WHITLOCK, L. S., ATKINS, J. G. & FIELDING, M. J., 1959.—“Relations between nematodes, fumigation and fertilization in rice culture.” **43** (1), 33-40.
- d. BIRCHFIELD, W., COWPERTHWAIT, W. G., POUCHER, C. & McNAMEE, J. M., 1959.—“Sampling ‘pulled and treated’ areas for the burrowing nema *Radopholus similis* (Cobb) Thorne.” **43** (1), 41-46.

(49a) Gaskin found localized gall-like swellings in roots of the grasses *Cenchrus pauciflorus*, *Setaria lutescens* and *Aegilops squarrosa*. No nematodes were found in the swellings although in the same test *Meloidogyne incognita* var. *acrita* reproduced in the roots of cereals and other grasses. Two-day-old seedlings of *A. squarrosa* grown in soil heavily infested with *Meloidogyne* sp. contained many larvae without galling; two or three weeks later root abnormalities were present, but no nematodes. It is assumed that high populations of root-knot nematodes can produce root abnormalities but the nematodes either die or leave the roots. M.T.F.

(49b) Schuster was not able to demonstrate in green-house experiments that the root-knot nematode, *Meloidogyne incognita*, provided wound entry points in bean plants for infection by the bacterial wilt organism, *Corynebacterium flaccumfaciens* (Hedges) Dows. var. *auratiacum* Schuster & Christensen. He maintains that, under field conditions, nematode damage, natural root-wounding and injury by cultivation should enable the micro-organism to infect the bean plants. Dissemination of the bacterium, in irrigation water, shown in green-house experiments, was not proved under field conditions. Seed infection was very rare. J.E.P.

(49c) Hollis *et al.* found that soil fumigation treatments of D-D and methyl bromide, and fertilizer treatments of phosphorus, potash and nitrogen, exerted independent additive effects on rice yields. Retardation of reducing activity in fumigated plots, especially those treated with methyl bromide, caused phosphorus to inhibit plant growth, but this effect was overcome with the addition of ammonia nitrogen. The total fumigant effect was divided into nutritive and hygienic factors, the former being partially replaceable by fertilizers, the latter being due to the destruction of soil pathogens. Laboratory studies showed that *Tylenchorhynchus martini* and fungi, present in the rice fields, were not sufficiently pathogenic to account for the full hygienic effects achieved by fumigation and the authors postulate the destruction, by the fumigant, of multiple unknown competitive factors. J.E.P.

(49d) Citrus areas in Florida which had been “pulled and treated” (trees removed and burned and soil treated with D-D) to control *Radopholus similis*, were examined two years later to estimate the nematode fauna associated with citrus sprouts and various weeds. While many plant-parasitic species had returned in force, very few of the numerous soil and root samples processed contained *R. similis*. The nematode was not found in formerly infested areas with successfully defined margins where all citrus sprouts had been removed and clean fallow practised for six months after treatment. The authors conclude that the method is basically sound, but needs to be practised rigorously and should be followed by fallowing. R.D.W.



**49—Plant Disease Reporter (cont.)**

- e. MINTON, N. A. & HOPPER, B. E., 1959.—“The reniform and sting nematodes in Alabama.” **43** (1), 47.
- f. LAUTZ, W. H., 1959.—“Increase of *Belonolaimus longicaudatus* on various plant species in artificially inoculated soil.” **43** (1), 48–50.
- g. NORTON, D. C., 1959.—“Relationship of nematodes to small grains and native grasses in North and Central Texas.” **43** (2), 227–235.
- h. GOOD, J. M., STEELE, A. E. & RATCLIFFE, T. J., 1959.—“Occurrence of plant parasitic nematodes in Georgia turf nurseries.” **43** (2), 236–238.
- i. DARLING, H. M., 1959.—“Control of the potato rot nematode in Wisconsin.” **43** (2), 239–242.
- j. MORTON, D. J., 1959.—“The control of cotton root-knot by the addition of 1,2 dibromo-3-chloropropane to irrigation water.” **43** (2), 243–247.

(49e) Minton & Hopper found males and larvae of *Rotylenchulus reniformis* in soil associated with poor growing cotton in eastern Alabama. The infestation was verified by growing cotton and cucumbers in pots of the soil in a green-house when adult females of *R. reniformis* were obtained from the roots of both species within four weeks. *Belonolaimus longicaudatus* was found in one location with peanuts and in cotton fields at three different locations in Alabama. D.J.H.

(49f) The population increase of *Belonolaimus longicaudatus* was determined for various plant species. Greatest increases occurred in the presence of potato and soya bean, low increases with cantaloupe and field maize and no increase was detected in the presence of carrots and pepper. H.R.W.

(49g) A survey was made of parasitic nematodes associated with roots of cereals and grasses in North and Central Texas. Although several species occur commonly Norton concludes, on the basis of distribution and pathogenicity studies in the field and green-house, that most nematodes are not the chief agent responsible for poor yields of wheat in North Texas. H.R.W.

(49h) A survey of Georgia turf nurseries was carried out in 1956 and 1957 and 387 samples were taken which included Bermuda, Centipede, St. Augustine and Zoysia grasses. *Trichodorus christiei*, *Xiphinema americanum*, *Helicotylenchus nanmus* and *Pratylenchus brachyurus* were encountered in many samples. *Belonolaimus* sp. was found in only 5% of all the samples but was present in all ten samples of *Zoysia matrella*. D.J.H.

(49i) Following the discovery of field infestations of *Ditylenchus destructor* in Wisconsin in 1953, soil treatment trials were set up on well infested land in May, 1954 using the nematocides Dowfume W-85, VC 13, Nemagon and D-D. Application was by split plough sole at a depth of 8 in. in well worked soil, the soil temperature being between 50°F. to 80°F. and the soil moisture high. Potatoes were planted in the following June; observations during the summer showed varying degrees of phytotoxicity in all treatments. Examination of the potatoes at harvest showed that only plots treated with W-85 EDB were completely clean. A second trial using EDB was carried out on well infested land using split plough sole applications of 4 gal. per acre in June followed by 2 gal. per acre in August, 1955. Potatoes were planted in spring 1956. No infested tubers were found on treated plots at harvest or after storing for four to six months. The same result was obtained when the plots were cropped again in 1957 without further treatment. Soil fungicides when applied with a 2- and 2-gal. per acre split application of EDB also gave *D. destructor*-free crops. D.J.H.

(49j) Morton applied dibromochloropropane in irrigation water 10 days before planting to part of a cotton field infested with *Meloidogyne* sp., the remainder of the field being left as a control. Examination of cotton seedlings three weeks after planting showed that, in the treated rows, stand counts were slightly lower with a larger number of dead seedlings present. However, cotton yields and root growth were much increased and the root-knot index reduced by treatment. It is concluded that this method of application is both satisfactory and economical, particularly as there is evidence to suggest that lower rates of DBCP may be sufficient. J.E.P.

**49—Plant Disease Reporter (cont.)**

- k. MORTON, D. J., 1959.—“The use of a granular nematicide applied at listing in controlling cotton root-knot.” **43** (2), 248–252.
- l. JENSEN, H. J., MARTIN, J. P., WISMER, C. A. & KOIKE, K., 1959.—“Nematodes associated with varietal yield decline of sugar cane in Hawaii.” **43** (2), 253–260.
- m. FELDMESSER, J., REBOIS, R. V. & TAYLOR, A. L., 1959.—“Progress report on growth responses of burrowing nematode infected citrus following chemical treatments under greenhouse conditions.” **43** (2), 261–263.
- n. MARLATT, R. B. & ALLEN, R. M., 1959.—“Control of tomato root knot in Arizona with fumigants.” **43** (3), 309–310.
- o. MYERS, R. F. & DROPKIN, V. H., 1959.—“Impracticability of control of plant parasitic nematodes with ionizing radiations.” **43** (3), 311–313.
- p. LEAR, B. & LIDER, L. A., 1959.—“Eradication of root-knot nematodes from grapevine rootings by hot water.” **43** (3), 314–317.

(49k) Morton compared the application of liquid and granular Nemagon to cotton fields infested with root-knot. The rates of application to obtain improved yield and reduced infestation were equal to  $\frac{1}{2}$  or  $\frac{3}{4}$  gallon of dibromochloropropane per acre. Liquid Nemagon gave better control and yield response, but against this is set the greater convenience of granular application in conjunction with pre-plant cultivation. The reduced effectiveness of ethylene dibromide is attributed to the faster disappearance of the fumigant from the soil. J.E.P.

(49l) Eight genera of plant-parasitic nematodes were found associated with sugar-cane roots: *Radopholus*, *Meloidogyne*, *Pratylenchus*, *Helicotylenchus*, *Trichodorus*, *Xiphinema*, *Cricone-moides* and *Pratylenchus*. Of these, three are considered to be the most important—*Meloidogyne*, *Pratylenchus* and *Helicotylenchus*—since they were most numerous and were frequently found attached to, or within, the roots. H.R.W.

(49m) Feldmesser *et al.* found that the elimination of *Radopholus similis*, in soil taken from areas of spreading decline of citrus, did not prevent the decline of seedlings planted in the treated soil. The application of Captan to affected soil improved the growth of grapefruit seedlings. Captan is fungicidal but not nematicidal and it is concluded that some other factor apart from nematodes was controlled. J.E.P.

(49n) Marlatt & Allen found that, in general, ethylene dibromide, at rates of 7 to 10 U.S. gal. per acre, gave the greatest reduction in root-knot infestation and the best yield response in replicated experiments with hot sandy, tomato growing soils of Arizona. Dichloropropene nematicides and dibromochloropropane were also used. Yield effects in a later experiment were probably obscured by severe virus attack. J.E.P.

(49o) Eleven species of plant-parasitic nematodes were irradiated and the dose required for sterilization determined. A large reduction in the reproduction of most species was achieved with a dose of 80,000 roentgens. Irradiation of nematodes in field soil is impracticable because of the length of time required to treat even small areas. Control of plant-parasitic nematodes in and on plant roots by ionizing radiations is not feasible because damage to the roots occurs at lower levels than those required to disrupt the nematode's life-cycle. H.R.W.

(49p) Rootings of grapevine varieties Black Rose and Perlette infested by *Meloidogyne incognita* var. *acrita* and *M. javanica* respectively were treated with warm water for the control of the nematodes. Eradication of the parasites followed treatments for 30 min. at 118°F., 10 min. at 120°F. and 122°F., 5 min. at 125°F., 3 min. at 127°F. and 2 min. at 130°F. and 135°F. Below 130°F. for the times tested there was no injury to the tops or roots. Some roots were killed at 130°F. for 3–5 min. and at 135°F. for 2–4 min., but new roots were produced. Methyl bromide fumigation of the rootings at 2 lb. per 1,000 cu.ft. for 2 hours was ineffective. M.T.F.



## 49—Plant Disease Reporter (cont.)

- q. BAIN, D. C., 1959.—“ Selection for resistance to root knot of white and red clover.” **43** (3), 318–322.
- r. RHOADES, H. L. & LINFORD, M. B., 1959.—“ Control of *Pythium* root rot by the nematode *Aphelenchus avenae*.” **43** (3), 323–328.
- s. TAYLOR, D. P. & SCHLEDER, E. G., 1959.—“ Nematodes associated with Minnesota crops. II. Nematodes associated with corn, barley, oats, rye, and wheat.” **43** (3), 329–333.
- t. RANKIN, H. W. & GOOD, J. M., 1959.—“ Effect of soil fumigation on the prevalence of southern blight on tomatoes.” **43** (4), 444–445.
- u. THOMASON, I. J. & MCKINNEY, H. E., 1959.—“ Reaction of some Cucurbitaceae to root-knot nematodes (*Meloidogyne* spp.)” **43** (4), 448–450.
- v. TARJAN, A. C., 1959.—“ Pressure injection of chemicals for possible systemic action against burrowing nematodes infecting citrus.” **43** (4), 451–458.
- w. LEAR, B., 1959.—“ Application of castor pomace and cropping of castor beans to soil to reduce nematode populations.” **43** (4), 459–460.

(49q) Bain tested several varieties, lines or introductions of red clover (*Trifolium pratense*) and white clover (*Trifolium repens*) for their reaction to *Meloidogyne incognita* and *M. incognita* var. *acrita*. From several thousand plants sown, about 400 seedlings showing only a trace or slight galling were selected. Some of these were open pollinated, sibbed or both; and inoculation tests on first and second generation progeny indicated the presence of factors for at least partial resistance in both red and white clovers. D.J.H.

(49r) The status of *Aphelenchus avenae* as a plant pathogen has been doubtful, although it was well known as a fungal feeder on agar plates. The authors showed that when added in considerable numbers to experimental pots in which maize was attacked by *Pythium arrhenomenes* the fungal attack was mild. *Pythium* alone caused heavy damage and the nematodes alone caused no damage. *A. avenae* did not invade healthy roots. J.B.G.

(49s) A survey of cereal fields in Minnesota revealed 21 genera of plant-parasitic and suspected plant-parasitic nematodes. The method of soil sampling and soil processing and the method of fixing and examination of the nematodes are described. There are tables listing the nematodes associated with each cereal crop plant. J.J.H.

(49t) Rankin & Good found that D-D, and possibly Nemagon, treatment of the sandy loam soils of Georgia increased the incidence of southern blight (*Sclerotium rolfsii*) on tomatoes. J.E.P.

(49u) Thomason & McKinney tested eight varieties of cucumber (*Cucumis sativus*), 19 varieties of cantaloupe (*C. melo*), 15 of winter melons (*C. melo*), one water-melon (*Citrullus vulgaris*), one pumpkin (*Cucurbita pepo*) and six squashes (*C. pepo*, *C. moschata* and *C. maxima*) for their susceptibility to three species of root-knot nematodes. All 50 varieties were susceptible to *Meloidogyne incognita* var. *acrita*; all 33 varieties tested against *M. javanica* were also susceptible. The cucumbers were all susceptible to *M. hapla* but reaction of the other varieties was mixed owing to there being two different populations of *M. hapla*. The population used to inoculate the pumpkin, water-melon and squashes failed to produce more than a light infection. It is pointed out that the existence of races within *Meloidogyne* species should be considered by plant breeders searching for resistant varieties. M.T.F.

(49v) Tarjan describes an apparatus for injecting chemicals, under pressure, into the trunks of orange trees infected with burrowing nematodes, *Radopholus similis* (Cobb). Many chemicals and differing formulations were tested and some treatments resulted in partial control which, however, varied with fluctuations in nematode densities throughout the sampling period of 12 weeks. J.E.P.

(49w) Castor pomace (the pulpy mass left after the oil has been expelled from the bean) used at five to ten tons per acre reduced the numbers of larvae emerging from cysts of *Heterodera rostochiensis*. In laboratory experiments, at least 4 gm. of pomace per half gallon of soil was needed to reduce the number of galls of *Meloidogyne javanica* or number of cysts

of *H. schachtii* on test plants. The high rate of application of the pomace and the difficulty of applying it make commercial use uneconomic. Growing castor beans in soil did not produce a useful reduction of the nematode population. J.J.H.

#### 50—Postgraduate Medical Journal. London.

- a. CHAPPELL, A. C., 1959.—“Cerebral cysticercosis complicated by pyogenic meningitis.” 35 (401), 156–159.

#### 51—Praktische Tierarzt (Der).

- a. BOCH, J., 1959.—“Beitrag zur Wurmtherapie bei Schweinen mit Piperazin.” Year 1959, No. 1, pp. 6–8.

(51a) Boch treated 1,100 pigs with piperazine citrate and piperazine adipate at doses ranging from 150 mg. per kg. body-weight to 300 mg. per kg. in food. The animals carried considerable numbers of ascarids, *Oesophagostomum* and *Hyostrongylus*. The piperazine doses recommended in individual treatment are, 200 mg. per kg. against ascarid infections and 250 mg. per kg. against *Oesophagostomum*. In group treatment 250 mg. per kg. of piperazine is recommended against ascarids and 300 mg. per kg. against *Oesophagostomum* or mixed infections. [From the tables the rate of cure is not clear.] N.J.

#### 52—Prensa Médica Mexicana.

- a. PÉREZ TAMAYO, R. & FLORES B., F., 1959.—“Datos generales de 2202 autopsias.” 24 (Edición especial), pp. 117–118.  
b. BIAGI F., F., 1959.—“Sección de Parasitología. Resumen de actividades.” 24 (Edición especial), pp. 157–159.

(52a) Pérez Tamayo & Flores report on their findings in 2,202 persons of both sexes and all ages, examined post mortem. In 38 cysticerciasis was believed to have been the principal cause of death. N.J.

(52b) Biagi describes briefly the creation and activities of the parasitological section within pathological services. N.J.

#### 53—Proceedings of the Linnean Society of New South Wales.

- a. BLAKE, C. D., 1959.—“A turbidimetric method for estimating the number of nematode larvae in a suspension.” 83 (5), 241–244.

(53a) Blake describes a turbidimetric method for estimating the number of nematode larvae in an aqueous suspension stabilized with 0.5% carboxymethyl cellulose. A modified Peters counting chamber was used to count the larvae in a number of 10 ml. samples. The turbidity of each sample was measured in a Hilger “Spekker” absorptiometer fitted with H 508 filters; samples of suspending fluid were used to standardize the readings. A standard curve was constructed relating the logarithm of absorption and the number of nematodes in suspension. This was used to predict the number of nematodes in a suspension, the logarithm of absorption of which had been measured. The results were rapidly obtained, amenable to statistical analysis and, for *Anguina agrostis* (Steinbuch) Goodey, the percentage error in the prediction from the standard curve was less than 5%. J.E.D.K.

#### 54—Proceedings of the Royal Society of Medicine.

- a. GOTTLIEB, B., 1959.—“Chyluria due to filariasis.” 52 (2), 139–140. [Discussion p. 140.]



**55—Proceedings of the Society for Experimental Biology and Medicine.**

- a. KOPPISCH, E. & OLIVER-GONZÁLEZ, J., 1959.—“Agglutination of erythrocytes *in vivo* in mice after injection of *Ascaris* extracts, related to immunization with human erythrocytes.” **100** (4), 827–829.

(55a) Koppisch & Oliver-González immunized mice of A strain against human erythrocytes of groups B and O, and subgroups A<sub>1</sub> and A<sub>2</sub>. The animals were then injected with saline extracts of the cuticle of *Ascaris*. Animals of subgroup A<sub>2</sub> showed marked changes in liver and kidneys; the others, including the controls, showed no reactions. The authors concluded that these results show a relation between blood groups and pathological changes produced by infectious organisms.

W.P.R.

**56—Public Health Reports. Washington.**

- a. KAGAN, I. G., 1959.—“Trichinosis in the United States.” **74** (2), 159–162.

(56a) Kagan gives an outline of the problems and a review of some of the conclusions reached on trichinellosis in the U.S.A. since the two Chicago conferences in 1952 and 1954. It is estimated that about 16% to 30% of the American population are carriers of the disease. Approximately 94.5% of 12,423 farms feeding garbage to swine report that it is cooked before feeding for the destruction of various swine epidemics. This control is not fully effective against *Trichinella spiralis* because some farmers do not adhere to the law and inspection is not always adequate. Although prohibition of garbage feeding would drastically reduce incidence, it would not eradicate the infections due to the sylvatic existence of *Trichinella* in rats and other scavengers. Furthermore, about 35% of the U.S. communities sell their garbage for civic funds. Quick freezing of all pork meat would not be economically feasible but the storing of pork under freezing conditions before consumption is doing much to lower incidence. The best measure—thorough cooking by the consumer—cannot be relied on. Instruction of the population in health protection must be continued and more efficient control methods developed.

G.I.P.

**57—Queensland Agricultural Journal.**

- a. MILLAR, R., 1959.—“Guard against these ailments in your horses.” **85** (5), 313–319.

(57a) This article on horse care includes some general notes on the life-cycle and treatment of the red worm and the large roundworm.

G.I.P.

**58—Revista Brasileira de Biologia.**

- a. ZAGO FILHO, H., 1959.—“Os gafanhotos como hospedeiros intermediários da *Physaloptera praeputialis* Linst., 1889 e da *Turgida turgida* (Rud. 1819) Trav., 1920 (Nematoda, Spiruroidea).” **19** (1), 9–12.
- b. ZAGO FILHO, H., 1959.—“Diferenciação sexual das larvas em terceiro estágio de *Physaloptera praeputialis* Linst., 1889 e *Turgida turgida* (Rud., 1819) Trav., 1920 (Nematoda, Spiruroidea).” **19** (1), 17–20.
- c. LORDELLO, L. G. E., 1959.—“A nematosis of yam in Pernambuco, Brazil, caused by a new species of the genus *Scutellonema*.” **19** (1), 35–41.
- d. KLOETZEL, K., 1959.—“A reação de precipitação periovular na esquistossomose. I. Investigações sobre a natureza da reação.” **19** (1), 75–85. [English summary pp. 84–85.]

(58a) Zago reports the finding of natural infections of third-stage larvae of *Physaloptera praeputialis* and *Turgida turgida* in grasshoppers in Brazil. Laboratory experiments demonstrated that infections with these nematodes could easily be established in the following species: *Orphulella punctata*, *Eutryxalis filata* and *Dichroplus punctulatus*. The author concludes that these grasshoppers may be considered as normal hosts for both of the nematode species considered.

C.W.

(58b) Zago has confirmed by means of experimental infections that it is possible to differentiate between the sexes of third-stage larvae of *Turgida turgida* but not those of

*Physaloptera praeputialis*. In *T. turgida* the genital rudiment in the female is situated in front of the junction of the oesophagus and intestine while in the male it is posterior to this point. Larvae separated on these criteria and fed to opossums gave rise to unisexual infections. C.W.

(58c) *Scutellonema dioscoreae* n.sp. is described and figured. It resembles *S. bradyi* and *S. blaberum* in attacking yam tubers but differs from the former in the size of the female tail and the position of the phasmids, and from the latter in the size of the female tail and the shape of the stylet knobs. A key to the seven species of the genus is given. J.B.G.

(58d) Kloetzel has investigated some of the factors affecting the circum-oval precipitin reaction around eggs of *Schistosoma mansoni* in immune serum. The eggs used for the tests were all obtained from the livers of mice about 50 days after infection and the serum used was a very active one from a three-year-old girl who was passing many eggs of *S. mansoni*. Preliminary observations indicated that the optimum time of incubation of the tests was 24 hours at 37°C. In assessing results Kloetzel takes into consideration all mature eggs which show a positive reaction whether the miracidia are alive or dead and the negative eggs with living miracidia. He excludes immature and hatched eggs and those which are negative and contain dead miracidia. Using the two variable features of the reaction, number and maximum length of the projecting ribbons, an index "i" is given for the strength of the reaction. The sum of these indices for the eggs on a slide gives the over-all index "I" which is then used in assessing the results of tests under varying conditions. The necessity for using fresh eggs is stressed but the author considers that the age of the infection in the animal producing the eggs is unlikely to affect the results. Dilution of the serum produces a marked decrease in the reaction. The reaction is slightly intensified by prior inactivation of the serum for half an hour at 58°C. Partial inhibition of the reaction was obtained by dilution of the serum with the liquid obtained by the incubation of a number of eggs at 37°C. for 19 hours. Kloetzel concludes that the reaction is of the antigen/antibody type and that the antigen is a metabolic product of the miracidium. C.W.

## 59—Revista Ibérica de Parasitología.

- a. GONZÁLEZ CASTRO, J., LIZCANO HERRERA, J. & MARTOS GUTIÉRREZ, M. L., 1959.—"Comportamiento de la prueba de Suessenguth y Kline en cerdos sometidos a infestaciones triquinosas de diverso grado de intensidad." **19** (1), 3-23.
- b. JIMÉNEZ MILLÁN, F., 1959.—"Contribución al estudio de los helmintos parásitos de los animales domésticos." **19** (1), 25-68.
- c. GUEVARA, D. & MONTEOLIVA, M., 1959.—"Alfa-amilasa en *Ascaridia galli*." **19** (2), 105-111.
- d. GUEVARA POZO, D., 1959.—"Las fases iniciales en el desarrollo del *Ascaris lumbricoides* del cerdo. II. Experiencias sobre la viabilidad de los huevos y formación del embrión." **19** (2), 113-122.

(59a) González *et al.* report on experiments with the Suessenguth & Kline antigen for the detection of trichinellosis in pigs in abattoirs. Ten pigs were used from three different litters. The infections with *T. spiralis* varied from very heavy to very light. The animals were infected orally with mature material taken from mice and rabbits. The methods of biopsy, trichinoscopy and post-mortem digestion were used together with the S.K. antigen method. The serum for flocculation was chiefly obtained from the external ear. Intramuscular injections of hyaluronidase and papain were given and the viability of the larvae was examined after the positive reaction had become negative. Positive reaction depended on the intensity of infection when the difference in number of infecting larvae was great. In all the animals, in which positive reaction became negative, viable larvae were found. In one case the injection of hyaluronidase did not modify a weak positive reaction nor did it have any effect in three other cases, where the reaction changed to negative. In another animal the positive reaction was increased after an injection of papain. The authors conclude that the S.K. antigen could not be successfully used on its own but should be employed in conjunction with trichinoscopy.

N.J.



(59b) Jiménez reports on a study of helminths parasitizing cats and dogs. He gives a very detailed report, in which he lists and describes the parasites, together with tables, plates and an extensive bibliography. The species most frequently found in dogs (25%) was *Taenia pisiformis*. The commonest species in both hosts were *Toxascaris leonina* (14.9% in dogs and 16.8% in cats) and *Dipylidium caninum* (21.2% in dogs and 7.5% in cats). *Ancylostoma caninum* was found for the first time in cats in Spain. The following species of Dilepididae were found: (i) in cats, *Diplopilidium acanthotetra*, *D. nölleri*, *Dipylidium caninum*, *D. porimamillanum*, *D. örleyi*, *Joyeuxiella pascualei* and *J. chyzeri*; (ii) in dogs, *D. caninum*, *D. porimamillanum* and *D. örleyi*. *Spirocerca lupi* and *Dirofilaria immitis* were also noted in dogs. N.J.

(59c) Guevara & Monteoliva report on their experiments with amylase extracted from *Ascaridia galli*. The enzyme was compared with those from human saliva, barley and chicken pancreas, and with the action of hydrochloric acid. Chromatographic analysis showed that the amylase was of the  $\alpha$  type and therefore analogous to that of human saliva. N.J.

(59d) Guevara Pozo investigated the development and viability of the eggs of *Ascaris lumbricoides*. The eggs were hatched in 1% formol solution at 31.5°C. and the results tabulated. It is concluded that: (i) practically all the eggs which were near the vulva reached the embryonic stage; (ii) at the distance of 4 cm. from the vulva 95% reached that stage, whereas only 13% to 15% of those placed in the middle part of the uterus became embryonated; (iii) none of the eggs near the oviducts were found to develop; (iv) eggs extracted from the middle part of the uterus, and which had become embryonated took the normal time to develop to the embryonic stage plus the time which would be needed for their natural expulsion; (v) eggs extracted from the posterior part of the uterus matured more quickly than those that were left in it, possibly on account of the need of oxygen by the eggs during the process of segmentation; (vi) early embryonation occurred simultaneously with, but was independent of, membrane formation while the eggs were still in the uterus. N.J.

#### 60—Sborník Vysoké Školy Zemědělské a Lesnické v Brně. Řada B. Spisy Fakulty Veterinární.

- a. KLIMEŠ, B., KUBÍČEK, K. & TRNKA, F., 1959.—“Vliv dehelmintisace benzinem na larvální stadia *Ascaridia galli*.” 7 (1/3), 273–284. [German & Russian summaries p. 283.]
- b. DOBEŠ, M., 1959.—“Vliv česneku (*Allium sativum*) na *Trichinella spiralis* v mase.” 7 (1/3), 299–306. [English & Russian summaries pp. 305–306.]
- c. SCHANZEL, H., 1959.—“Rozšíření plicnívek u ovcí v ČSR.” 7 (1/3), 327–352. [German & Russian summaries pp. 349–351.]
- d. LUCKÝ, Z., 1959.—“Příspěvek k poznání žabrohlistů jižní Moravy, II.” 7 (1/3), 353–377. [German & Russian summaries pp. 376–377.]

(60a) Klimeš *et al.* discuss the efficacy of benzene against larval stages of *Ascaridia galli*. 2.5 ml. per kg. body-weight of the drug was injected into the crop of 21 to 26-day-old experimentally infected chicks. The first group (22 birds) received the treatment six days after infection and the second 13 days after infection. Faecal examination showed elimination of larvae only in the second group, where 20 birds eliminated 102 larvae within eight hours of treatment. At autopsy 1 to 16 days after treatment no marked difference was established in the number of larvae and their length between the treated birds and those of the control group (20 chicks). Neither was there any marked difference in the weight increase between treated and control chickens. N.J.

(60b) Dobeš reports that the degree of infection of hamsters and guinea-pigs with *Trichinella spiralis* was almost halved by feeding 0.2 gm. to 0.4 gm. of garlic to the animals. 50% of garlic in meat heavily infected with *Trichinella* rendered it sterile after 48 hours at 4°C., while 10% and 5% of garlic produced a similar effect after five months under the same conditions. N.J.

(60c) Schanzel examined from September 1956 to February 1958, 8,406 lungs of sheep slaughtered mainly in Brno and Prague. The animals came from 93 localities, in 29 of which the sheep were examined twice. *Dictyocaulus filaria* was found in 88.17%, *Protostrongylus kochi* in 78.50%, *Muellerius capillaris* in 88.17% and *Cystocaulus ocreatus* in 27.94% of the

localities investigated. The incidence of infection based on individual animals ranged from 3% to 100%. The author explains the distribution of these helminth infections from an ecological point of view. N.J.

(60d) Lucký completes the list of trematodes from fish in south Moravia which he commenced in 1957 [see also Helm. Abs., 26, No. 450c]. He also gives detailed descriptions of the following species, supplementing the descriptions published by him in 1957: *Dactylogyrus auriculatus* from *Abramis brama*, *D. borealis* from *Phoxinus phoxinus*, *D. difformis* from *Scardinius erythrophthalmus*, *D. hemiamphibothrium* from *Acerina cernua*, *D. malleus* from *Barbus barbus*, *D. minor* from *Alburnus alburnus*, *D. minutus* from *Cyprinus carpio*, *D. nybelini* from *Chondrostoma nasus* (this figures in the 1957 list under the provisional name of *D. chondrostomi*); *D. vranoviensis* from *Leuciscus cephalus*, *Gyrodactylus decorus* from *S. erythrophthalmus*, *G. longiradix* from *Acerina cernua*, *G. nemachili* from *Nemacheilus barbatulus*, *G. vimbi* from *Vimba vimba*, *G. wagneri cernuae* from *A. cernua*, *G. wagneri scardini* from *S. erythrophthalmus*. *Gyrodactylus* sp. 3, mentioned by the author in his paper in 1957, is described here as *G. wagneri tincae*. The specimens identified as *Dactylogyrus similis* by Lucký in 1957, according to Prost should be described as *D. vistulae* Prost, 1957. N.J.

#### 61—Schweizerische Medizinische Wochenschrift.

- a. WEGMANN, T. & FÜRST, C., 1959.—“Neuere Aspekte der Echinokokkenkrankheit.” 89 (2), 32–37. [English summary p. 37.]

(61a) Wegmann & Fürst describe three cases of *Echinococcus alveolaris* in the liver and two cases of *E. cysticus* in the lungs. Casoni skin test and Weinberg complement fixation reaction were negative in the cases of *E. alveolaris*. Diagnosis was made by puncture of the liver. Thymol was used in two of the three cases with only partial success in one case. The other and one more case ended in death. In one case of *E. cysticus* in the lungs, diagnosis was made by the Weinberg's reaction, radiography of the thorax and finding of hooks in the sputum. Casoni reaction was negative. The patient was successfully treated by thoracotomy. The fifth case was that of spontaneous rupture of *E. cysticus* cyst in the bronchial tree. Specific reaction was negative and the diagnosis was made by finding hooks in the sputum. It was cured spontaneously by expectoration. N.J.

#### 62—Science. Lancaster, Pa.

- a. VAN OVERBEEK, J., HUGHES, W. J. & BLONDEAU, R., 1959.—“Acrolein for the control of water weeds and disease-carrying water snails.” 129 (3345), 335–336.

(62a) Overbeek *et al.* describe field trials of acrolein, a compound produced for the destruction of water weeds in irrigation systems. Acrolein also shows high molluscicidal activity, laboratory tests indicating that it is twice as effective against adult *Helisoma trivolvis* as is sodium pentachlorophenate and more effective against snail eggs than copper sulphate. C.W.

#### 63—Scottish Agriculture.

- a. SHANKS, P. L., 1959.—“Gastro-intestinal worms in cattle and sheep.” 38 (4), 212–213.

(63a) Shanks briefly reviews standard methods of preventing gastro-intestinal nematodiasis in cattle and sheep. Avoidance of overstocking, alternate grazing of pasture with cattle and sheep, and early consultation of a veterinary surgeon for confirmation of specific diagnosis and treatment of choice are recommended. Reference is made to the recent development of a vaccine against lungworms in cattle. J.M.W.

#### 64—South African Sugar Journal.

- a. GORDON, J., 1959.—“Eelworms and sugarcane.” 43 (1), 27, 29.

(64a) This is a popular account of the symptoms and control—chemical, cultural and biological—of “nodule-forming” nematodes (presumably *Meloidogyne* spp.) on sugar-cane in South Africa. R.D.W.



**65—Span. London.**

- a. MEIJNEKE, C. A. R., 1959.—“Soil exhaustion in tree nurseries.” **1** (4), 2–5.
- b. McBETH, C. W., 1959.—“Nematode pests of perennial crops.” **2** (1), 10–14.
- c. LEWIS, D. J., 1959.—“*Simulium* flies—pest of man and beast.” **2** (1), 31–35.

(65a) Meijneke reviews the problem of soil tiredness in tree nurseries which, in the Netherlands, is generally attributed to root-lesion nematodes, particularly *Pratylenchus penetrans*. This has been confirmed by sampling surveys of affected soils and by pot tests. Several nematicides were found to give satisfactory control, one of the best being D-D. The yield response following soil treatment with D-D at rates of 60 to 120 ml. per sq.m. is described as an economically practical proposition, particularly with annual tree nursery crops. J.E.P.

(65b) This is a popular review of the nematodes infecting citrus, peach, walnut, cherry, grape, fig, banana, strawberry and pineapple. The nematodes mentioned include *Meloidogyne* spp., *Tylenchulus semi-penetrans* Cobb, *Radopholus similis* (Cobb) Thorne, *Pratylenchus* spp., *Belonolaimus gracilis* Steiner, *Trichodorus* sp., *Xiphinema* spp., *Cacopaurus epacris* Allen & Jensen, *Paratylenchus hamatus* Thorne & Allen, *Rotylenchus* sp., *Rotylenchulus reniformis* Linford & Oliveira, *Aphelenchoides cocophilus* Goodey, *Heterodera humuli* Filipjev and *Longidorus sylphus* Thorne. Problems involved in control of nematode pests on perennial crops are discussed and the known methods of control elaborated. A.M.S.

(65c) Lewis, referring to the extensive literature on *Simulium* flies, mentions a number of species. A general description of Simuliidae is given with illustrations. The author also gives some examples of control measures which have been used against these pests in various parts of the world. N.J.

**66—Speculum. Ohio State University.**

- a. WILSON, R. F., KOUTZ, F. R. & JORDON, A. W., 1959.—“Effectiveness of hygromycin B in the control of roundworms, nodular worms, whipworms.” **12** (2), [Reprint 4 pp.].

**67—Tijdschrift voor Diergeneeskunde.**

- a. UILENBERG, G., 1959.—“Diergeneeskunde in de Soedan.” **84** (1), 55–63. [English, French & German summaries p. 63.]
- b. DORSMAN, W., 1959.—“Hexachlorophene (G-11) against liver flukes (*Fasciola hepatica*) in cattle.” **84** (2), 100–103. [French, German & Dutch summaries pp. 102–103.]
- c. JANSEN, Jr., J., 1959.—“*Aelurostrongylus abstrusus*, longworm van de kat.” **84** (6), 352. [English summary p. 352.]

(67a) Uilenberg here gives a general survey of infectious and parasitic diseases of animals in the Sudan and of their treatment. Nine photographs illustrate the paper. Among the diseases discussed are infections with various gastro-intestinal helminths (*Fasciola gigantica*, *Haemonchus longistipes*, *H. contortus* and strongyle species). G.L.

(67b) Dorsman considers that carbon tetrachloride is too toxic for use against *Fasciola hepatica* in cattle and that the effective dose of hexachloroethane, which is often used, is too near the toxic dose and its effect on the flukes is nearly always disappointing. He found that doses of it up to 80 gm. produced no effective reduction of the fluke egg count. He treated eight cows with 15 mg. per kg. body-weight of hexachlorophene (G-11), which has been found effective for the removal of poultry tapeworms and determined that a single dose, given at this rate, either subcutaneously in oily solution or orally in oily solution or aqueous suspension, reduced the fluke egg count to zero or nearly so in all the eight cows. In two cows given 20 mg. per kg. there were no toxic effects, but Dorsman thinks that more data are needed before this treatment should be considered safe for general use; the possibility of dangers to public health due to effects of the drug or of its decomposition products on meat and milk should be investigated. G.L.

(67c) Jansen reports on the finding of *Aelurostrongylus abstrusus* in a cat. N.J.

**68—Tijdschrift over Plantenziekten.**

- a. KORT, J., 1959.—“Enkele waarnemingen over populatieschommelingen bij het haverzysten-aaltje, *Heterodera avenae* (= *H. major*) onder invloed van enige gewassen op zandgrond.” **65** (1), 1-4. [English summary p. 3.]
- b. KUIPER, K. & SILVER, C. N., 1959.—“Een proef met *Ditylenchus destructor* van verschillende herkomsten.” **65** (2), 64.
- c. OOSTENBRINK, M., 1959.—“Enige bijzondere aaltjesaantastingen in 1958.” **65** (2), 64.
- d. OUDEN, H. DEN & LABRUYERE, R. E., 1959.—“De betekenis van *Hoplolaimus uniformis* en *Fusarium oxysporum* bij het ontstaan van vroege vergeling in erwten.” **65** (2), 64-65.
- e. SEINHORST, J. W. & RIEZEBOS, D., 1959.—“Enkele proeven over de bestrijding van staartpeen.” **65** (2), 65.

(68a) By estimating the pre- and post-cropping populations of the cereal root eelworm (*Heterodera major*) in many fields in the Limburg province of Holland, Kort found that oats is an efficient host plant, but rye, some grasses and leys decrease the eelworm population and may be suitable crops to precede oats on infested land. J.J.H.

(68b) The authors report that experiments show there are no physiological races of *Ditylenchus destructor* in Holland but that the nematode will attack potato, bulbous iris, *Tigridia pavonia*, *Tulipa praestans* and *T. saxatilis*. J.B.G.

(68c) Oostenbrink records new and noteworthy eelworm attacks on plants for 1958 which include *Aphelenchoides ritzema-bosi* on *Buddleia davidii* Franch. and *A. fragariae* on *Lilium speciosum* Thbg. Corms of *Crocus vernus* Hort. were attacked by *A. subtenius* and a few by *Ditylenchus destructor*. *D. dipsaci* was found on *Dianthus barbatus* L. and *Polianthes tuberosa* L. On grasslands four, and on clovers three, species or races of *Heterodera* have been found and *Tylenchorhynchus dubius* and *Rotylenchus* spp. are also of importance. An undescribed *Rotylenchus* sp. and *Criconemoides* spp. are pasture parasites. *Hemicycliophora* sp. (probably *H. typica*) was found with poor-growing carrots, lettuce, iris and other crops grown in a new marine sandy soil. *Pratylenchus penetrans* occurred in the roots of tomatoes and a few ornamental plants. A *Pratylenchus* sp. was found in *Convallaria majalis* L. *Rotylenchus robustus* occurred with endive, lettuce, scorzonera, and dwarf bean and together with *Tylenchorhynchus dubius* in peas in newly cultivated ground. *Tylenchorhynchus claytoni* attacked *Azalea* and *Rhododendron* sp. and *Xiphinema diversicaudatum* attacked *Rosa* spp. D.J.H.

(68d) The authors grew peas (unnamed variety) in agar, using the foam-agar technique of den Ouden, and inoculated them with *Hoplolaimus uniformis* and *Fusarium oxysporum* (unnamed strain and race), both together and separately. They claim that more damage occurred to the root cortex with the two organisms in combination than singly. A.M.S.

(68e) Seinhorst & Riezebos briefly describe attempts to control “Staartpeen”, a serious carrot root disease occurring in the Rockanje district, the cause of which is unknown. Soil in which the disease occurred was treated with either D-D or Vapam. Under certain conditions D-D treatment gave a healthy crop but Vapam was ineffective. After examining for nematodes soil in which the disease occurred and following the build-up of nematodes in treated land the authors conclude that nematodes are not the cause of the disease. D.J.H.

**69—Veterinariya.**

- a. ALIEV, A. A., 1959.—[Chemical prophylaxis of *Dictyocaulus* infection in sheep.] **36** (1), 41-42. [In Russian.]
- b. SVADZHYAN, P. K., 1959.—[The migratory routes of the cercaria of *Dicrocoelium lanceatum* Stiles & Hassall, 1896 in the definitive hosts.] **36** (4), 45-48. [In Russian: English summary p. 48.]
- c. IVANOV, B. V., 1959.—[Anthelmintic treatment of *Ascaridia* in fowls with fluorine preparations.] **36** (5), 18-20. [In Russian.]
- d. KOROPOV, V. M., 1959.—[A problem of zonal pathology.] **36** (7), 22-30. [In Russian.]
- e. VESELOVA, T. P. & VELIKOVSKAYA, Y. A., 1959.—[The use of  $\text{CCl}_4$  against fascioliasis in cattle.] **36** (7), 39-41. [In Russian.]
- f. MOZGOVOI, A. A. & BICHIKHIN, M. T., 1959.—[The treatment of *Echinuria* infection in ducks with  $\text{CCl}_4$ .] **36** (7), 44. [In Russian.]



(69a) Aliev in Uzbekistan obtained good results in the prevention of *Dictyocaulus* infection in sheep by feeding them daily with 1 gm. of phenothiazine mixed with food. The treatment lasted 117 days in one group and 136 days in another (from December to April). The animals looked well and their body-weight was 6.5% higher than in control animals. There was also an increase in wool production and the mortality due to other causes was reduced. C.R.

(69b) Svadzhyan investigated experimentally the migratory route of *Dicrocoelium dendriticum* in the final host, by feeding ants containing metacercariae to a lamb, two rabbits and four guinea-pigs. At post-mortem examination two hours to 15 days after feeding he found the young flukes in the common bile-duct in all animals and in all except one in the liver. Some were also present in the gall-bladder. The bile-ducts were reached as early as two hours after infection in the guinea-pig. Svadzhyan carefully examined the portal vein and body-cavity of sacrificed animals but no flukes were present. These results are contrary to those of Neuhaus (1938), who claimed that metacercariae reach the liver via the portal blood system. C.R.

(69c) Ivanov in his experiments on the treatment of hens infected with *Ascaridia* found that an effective dose of sodium silicofluoride was 0.06 gm. per kg. body-weight, given morning and night for four days mixed with food. Poultry houses should be disinfected with a 2% solution of caustic soda or with boiling water. Ivanov found sodium fluoride less effective and more toxic to birds. He recommends that the treatment be repeated after 24-30 days. C.R.

(69d) Koropov, discussing the science of zonal pathology, gives zonal helminthology as a sub-division of the latter. He gives examples of locally and focally distributed helminthiasis, depending on geographical factors. N.J.

(69e) Veselova & Velikovskaya, injected intramuscularly 20 ml. of carbon tetrachloride with equal quantity of vaseline oil per 100 kg. body-weight to 65 cows infected with fascioliasis. Another five cows received half the dose, while the control group consisted of ten animals. At autopsy on the second day, partly deformed flukes were found in the livers of the treated cows. In the livers of the animals that received 20 ml. of carbon tetrachloride per 100 kg. on the fifth and the seventh days no more flukes were found. The livers of the control animals yielded 23 to 115 flukes and those of the cows treated with half the dose 10 to 28 *Fasciola*. The full dose (20 ml.) of the drug was administered in the same way to another group of ten cows. The side effects that appeared on the second day after treatment and disappeared after five to ten days were: temperature rise by 0.5°C.-1.5°C., and acceleration of cardiac contractions and of rate of breathing in 20% of the experimental animals. Another 20% revealed slight increase in the number of leucocytes and urobilin in the urine. 10% of the animals, along with urobilin in the urine, also had bilirubin in the blood serum. Carbon tetrachloride administered at the same dose (20 ml.), and in the same way as in the preceding experiment, to 551 cows had 85% efficacy. The only side effect noticed was atonicity of the rumen in 1% to 2% of the animals treated. Cows due to calve, did so in the normal way. This drug administered to the cows of two farms with 73% and 70% *Fasciola* infections raised the milk yield by 24% and 42% respectively. At the same time at the control farm (59% infections) the milk yield was raised by 20%. However this farm had a much greater milk output before the experiment. N.J.

(69f) Mozgovoi & Bichikhin, treated 1,100 domestic ducks with carbon tetrachloride against *Echinuria* infection. Approximately 1 ml. of the drug per kg. body-weight was given through the mouth. Within two weeks the birds were completely cured. While using the drug following reinfection of some birds, it was found to be inefficient against young parasites. This is explained by the walls of the tumours being intact and thus preventing the drug from reaching the parasite within the tumour. N.J.

**70—Veterinarski Arhiv.**

- a. RICHTER, S., 1959.—“Parasitska fauna srne (*Capreolus capreolus* L.) u NR Hrvatskoj.” **29** (1/2), 34–45. [English & German summaries pp. 43–45.]
- b. WIKERHAUSER, T. & BRGLEZ, J., 1959.—“Prilog poznavanju entoparazitske i ekto-parazitske fauna štakora *Epimys norvegicus* (Erxleben).” **29** (3/4), 105–107. [English & French summaries p. 107.]

(70a) Richter reports on the parasite fauna of roe-deer in Croatia, where 47 specimens shot or dead as result of parasitic infection were examined from 1953 to 1955. All the animals were found to be infected with endoparasites, 22 species of which were recorded and 40 of them were also infected with ectoparasites (10 species). For one to nine helminth species were found to parasitize the same host. The highest incidence of infection with helminths was with: *Chabertia ovina* (76.5%), *Trichuris ovis* (72.3%), *Dictyocaulus viviparus* (59.5%), *Setaria labiato-papillosa* (34%) and *Fasciola hepatica* (31.9%). From the pathological lesions the author concludes that *Fasciola hepatica* in three cases and *Dictyocaulus viviparus* in two were responsible for the death of animals and that *Paramphistomum cervi*, *Chabertia ovina*, *Trichostrongylus colubriformis* and *T. extenuatus* could be responsible for severe pathological lesions. N.J.

(70b) Wikerhauser & Brglez, examined one adult and four young specimens of *Rattus norvegicus*. *Echinochasmus perfoliatus* was found from the small intestine of the adult rat. After studying the available literature, the authors suggest that this is the first report on *E. perfoliatus* from a rat. In the same specimen were found *Cysticercus fasciolaris* in the liver and numerous *Trichinella spiralis* larvae in the muscles. N.J.

**71—Veterinary Medicine.**

- a. OTTO, G. F. & BAUMAN, P. M., 1959.—“Canine filariasis.” **54** (2), 87–96.
- b. McCOWEN, M. C., GOSSETT, F. O., CALLENDER, M. E. & BRANDT, M. C., 1959.—“Anthelmintic effect of hygromycin B in swine.” **54** (2), 103–105.
- c. SIPPEL, W. L., 1959.—“Liver fluke egg counting.” **54** (5), 245–246.

(71a) Otto & Bauman review the identification of the microfilariae, the occurrence and transmission of *Dirofilaria immitis* and *Dipetalonema reconditum*, and the treatment and prophylaxis of heartworm infection in dogs. W.A.F.W.

(71b) Crude dried broth of *Streptomyces hygroscopicus* containing hygromycin B was included in the feed of swine to determine its anthelmintic effects. Groups of seven pigs known to be infected with *Ascaris*, *Oesophagostomum*, *Trichuris* and *Metastrongylus* were given three different concentrations of hygromycin B per ton of feed (25,600,000: 12,800,000: 6,400,000) and a fourth group was maintained on normal diet as controls. The medicated feed was given for five weeks and the animals were then slaughtered and examined for worms. Egg counts made during the post-treatment period indicated that numbers of eggs passed were greatly reduced by the second week. The drug was found to have a marked effect upon *Ascaris* and *Oesophagostomum*; some probable effect was observed against *Metastrongylus*. Data on drug effect against *Trichuris* will be published later. No toxic effects were experienced and weight gain and feed conversion were favourable. O.D.S.

(71c) Sippel describes the procedure in the technique for counting *Fasciola hepatica* eggs which was devised by Dennis, Stone & Swanson in 1954 [for abstract see *Helm. Abs.*, **23**, No. 29d]. He has found it quite useful. S.W.

**72—Veterinary Record.**

- a. ARNOLD, T. F., 1959.—“A case of acute septicaemia in the race-horse.” [Correspondence.] **71** (1), 20.
- b. ROSS, J. G., LEE, R. P. & ARMOUR, J., 1959.—“Haemonchosis in Nigerian Zebu cattle: the influence of genetical factors in resistance.” **71** (2), 27–31.
- c. ANON., 1959.—“Liver fluke outbreak in Wales.” **71** (3), 57.
- d. PETRIS, M. A., 1959.—“Nephrectomy in goats.” **71** (4), 68–69.
- e. HARROW, W. T., 1959.—“The toxicity of hexachloroethane.” **71** (6), 111–112.



- f. NICOLSON, T. B. & GORDON, J. G., 1959.—“An outbreak of helminthiasis associated with *Hyoststrongylus rubidus*.” **71** (7), 133.
- g. ANON., 1959.—“A vaccine against *Dictyocaulus viviparus*.” **71** (8), 153-154.
- h. SCARNELL, J. & RAWES, D. A., 1959.—“Bephenium embonate in the prevention of *Nematodirus* infestation in lambs.” **71** (9), 163-168.
- i. MACKENZIE, A., 1959.—“Studies on lungworm infection of pigs. III. The progressive pathology of experimental infections.” **71** (11), 209-214.
- j. HARROW, W. T., 1959.—“Control of lungworm disease in calves.” [Correspondence.] **71** (11), 223.
- k. GIBSON, T. E., 1959.—“The survival of the free-living stages of *Nematodirus* spp. on pasture herbage.” **71** (18), 362-366.
- l. SLATER, W., 1959.—“Animal husbandry: present and future.” **71** (19), 388-395.
- m. BAXTER, J. T., 1959.—“*Nematodirus* spp. infection and resistance in lambs.” [Correspondence.] **71** (20), 424.

(72a) Arnold discusses the symptoms and pathogenic effects of *Habronema* tumours in horses in relation to a previously reported case of acute septicaemia in a racehorse. Oesophageal tumours have little effect on physical condition or health, whereas gastric tumours, especially in the fundus or cardiac positions provoke chronic debility or recurrent colic. Diagnosis is made by washing out the stomach with a warm solution of sodium bicarbonate and running the washings through butter muslin. If habronemiasis is present the larvae will be seen wriggling on the muslin. Carbon tetrachloride by gastric intubation is the treatment of choice. The author has never known *Habronema* abscesses to be the primary focus of a septic infection. J.M.W.

(72b) Using worm egg counts and weight gains of individual animals in groups of White Fulani Zebu calves, Ross *et al.* calculated values to represent the relative resistance of individual animals to haemonchiasis. Individuals which appeared to be most resistant were shown to be related through their grandsire. After tests to show that the results were not merely reflections of differences in the general performance of the animals it was concluded that there was evidence of a genetically controlled resistance to haemonchiasis. H.D.C.

(72c) There is a major outbreak of fascioliasis and “black disease” in sheep in Montgomeryshire. Losses up to 60% have been reported. S.W.

(72d) Exploratory laparotomy in a six-year-old Damascus she-goat revealed an *Echinococcus* cyst of the left kidney, which was removed. The animal recovered quickly. J.M.W.

(72e) This paper is a short review of the toxicity of hexachloroethane as observed in the treatment of fascioliasis in cattle. The drug is less dangerous than carbon tetrachloride but it is not without toxic properties. While fatalities are probably at the rate of one in 20,000 in cattle and about one in 40,000 in sheep, non-fatal manifestations occur more frequently. The symptoms of hexachloroethane poisoning are similar to those of hypocalcaemia with lowered temperature, coldness of extremities and dullness that may develop into coma. There may be signs of abdominal pain and blood-stained diarrhoea. Post-mortem findings may include acute abomaso-enteritis with oedema of the mucous membrane, hyperaemia of the liver and kidneys and centri-lobular necrosis in the liver. Susceptibility to poisoning may be associated with heavy fluke infection (and therefore liver damage), high protein content of feed or when roots form a part of the diet. Since calcium salts appear to have some antidotal effects it may be thought that susceptibility to hexachloroethane is in some way associated with blood calcium imbalance. O.D.S.

(72f) Nicolson & Gordon record an outbreak of parasitic gastritis due to infection with the pig stomach-worm, *Hyoststrongylus rubidus*, in a herd of breeding sows on a farm in Perthshire. Emaciation, anaemia, inappetence and abnormally dry, hard faeces were the clinical features. Diagnosis was confirmed both by faecal examination and by the sacrifice of one animal, in which the worms and characteristic gastric lesions were found. Treatments with phenothiazine (20 gm. suspended in water as a drench) and piperazine (20 gm. added to the feed) were both successful in eliminating the worms and led to improvement in the condition of the sows. J.M.W.

(72g) This is a report of a press conference on the introduction of a vaccine against

*Dictyocaulus viviparus*. The vaccine consists of live lungworm larvae which have been partially inactivated by exposure to X-rays. The larvae so exposed retain their antigenicity but lose their pathogenicity. This is the first anti-parasitic vaccine to be developed and has opened up possibilities for the successful prevention of other serious helminthic diseases. K.H.

(72h) Each of two flocks of lambs exposed to natural infection with *Nematodirus filicollis* by grazing on pasture where infected sheep had grazed the previous year, were randomized into four treatment groups. Estimation of exposure to infection was made from the results of larval counts in herbage from March to the end of July. Bephenium embonate suspension was made up at the rate of 250 gm. per half gallon; the dose for lambs under 50 lb. was one-and-a-half fluid ounces and for those over 50 lb., two fluid ounces. Group I received a single dose one week after it had been estimated that the *Nematodirus* larval peak had been reached; Group II were given three doses at three-weekly intervals from the beginning of May; Group III was not treated; Group IV was used for treatment with other compounds. In both flocks single dose treatment reduced the faecal egg count for two weeks but thereafter it rose to approximately that of the controls. Although clinical nematodiriasis did not develop in the untreated control groups the weight gains in the lambs receiving three doses of bephenium embonate were more rapid and more even than those in the controls. It is considered that three doses of bephenium embonate suspension given at three-weekly intervals provided a high level of protection against infection with *N. filicollis*. O.D.S.

(72i) The author correlates the pathological changes occurring in the lungs of pigs infected with 4,000 larvae of *Metastrongylus elongatus* with the stage in the development of the infection. In the first prepatent larval migratory stage from one to nine days after infection no clinical macroscopical or histopathological manifestation of the disease was observed; but in the second prepatent stage or immature lungworm phase, occurring from ten to twenty-five days after infection, slight coughing, eosinophilia and the start of emphysema and consolidation was accompanied by mononuclear reaction, marked eosinophil infiltration, vesicular emphysema, bronchial muscle hypertrophy, the start of giant cell reaction and lymphoid hyperplasia. During the early patent stage which followed from the 25th to 40th day embryonated eggs were found in the faeces and the coughing was more marked but the eosinophilia showed decline. The emphysema and consolidation had become more established and pulmonary nodules were to be seen. The mononuclear reaction and eosinophil infiltration had declined whilst muscular hypertrophy, mucoid hyperplasia, giant cell reaction, lymphoid hyperplasia and eosinophil granulomata had increased. After 40 days the late patent stage occurred, marked by chronic bronchitis and chronic vesicular emphysema. Smooth muscle hypertrophy and lymphoid hyperplasia became more pronounced. At 80 days all the chronic symptoms of the disease were present. K.H.

(72j) Out of 589 calves, from herds with a past history of parasitic bronchitis, which had received treatment with cyanacethydrazide an outbreak occurred in only two groups. In both cases a few animals had been left untreated as controls. In one case the outbreak was too mild and transient to require treatment and in the other the outbreak was also mild but the calves responded immediately to treatment with cyanacethydrazide. K.H.

(72k) Gibson infected a half-acre paddock with eggs of *Nematodirus battus* and *N. filicollis* by stocking it during the summer of 1955 with four lambs infected with these species. He also spread faeces from other lambs similarly infected. The lambs were removed in October and the paddock left ungrazed until May 1956 when three worm-free lambs were introduced. Two of these lambs died as a result of *Nematodirus* infections and the third one was slaughtered in July. Details of worm egg counts and worm counts are given. The paddock was not grazed again until May 1958 when two worm-free lambs were introduced and left in it until the end of August 1958. These lambs acquired light infections of *N. battus* and *N. filicollis*. Throughout, monthly counts were made of the number of larvae on the herbage. Gibson showed that the paddock remained lightly infected even when it had been ungrazed for nearly two years. He suggests that the differences in levels of infection with *N. filicollis* and *N. battus* can be explained by differences in the rates of development of the two species. H.D.C.



(72l) In this lecture Slater discussed, among other topics, parasitic diseases with particular reference to liver-fluke infections. Our first need, Slater thinks, is for fuller knowledge of the physiology and biochemistry of farm animals and the second need is for better technical training for the men who work on the farms, whose task is becoming increasingly complex yet they are responsible for the health and productivity of farm stock. G.L.

(72m) Baxter discusses some of the observations made by Gibson on *Nematodirus* [see No. 72k above] referring particularly to interpretation of worm egg counts in relation to acquired resistance and to the persistence of *Nematodirus* infections on pastures. H.D.C.

### 73—Wiadomości Parazytologiczne. Warsaw.

- a. STEFAŃSKI, W., 1959.—“Życiorys Prof. dra W. L. Wiśniewskiego 1. IX. 1904–26. IX. 1958.” [The life of Prof. W. L. Wiśniewski 1.9.1904 to 26.9.1958.] 5 (1), 3–9.
- b. OSHMARIN, P. G., 1959.—“Zależność płodności przywr od objętości macicy i budowy jaj.” 5 (1), 11–13. [English summary p. 13.]
- c. GRABOWSKA, M. ET AL., 1959.—“Wyniki leczenia robaczyc jelitowych wśród pracowników przemysłu spożywczego.” 5 (1), 21–23. [English summary p. 23.]

(73b) The fertility of a trematode cannot be judged from the size of the uterus and the number of eggs contained in it (this being determined by the type of development of the eggs) but only by the number of eggs produced in a given time. G.I.P.

(73c) In Zielona Góra, Poland, a group of 1,451 working persons (from schools, shops etc.) who are liable to periodic examinations for typhoid bacteria, were subjected to three repeated examinations for intestinal helminths using five methods. 45.7% were found infected with enterobiasis, ascariasis, trichuriasis and taeniasis. The highest frequency occurred in school personnel. Suitable treatment to be done at home and to include the entire family was recommended and on control examination six months later of 817 workers the general infection had dropped to 28%. G.I.P.

### 74—World Health. Geneva.

- a. ANON., 1959.—“A man-made disease.” 12 (2), 26–31.

(74a) This is a brief pictorial account of bilharziasis and the campaign against it. Stress is laid on the fact that before the introduction of perennial irrigation, bilharziasis was almost unknown in many endemic areas. J.M.W.

### 75—Yokohama Medical Bulletin.

- a. NAGANO, A., TAKEUCHI, M., SEKI, J., TAKESHITA, Y., KURAKATA, T. & OHTSUKA, T., 1959.—“Über einen Fall von eosinophilem Leukämoid bei Paragonimiasis cerebri.” 10 (1), 60–67.

### 76—Zeitschrift für Parasitenkunde.

- a. FAHMY, M. A. M. & SELIM, M. K., 1959.—“Studies on some trematode parasites of dogs in Egypt with special reference to the role played by fish in their transmission.” 19 (1), 3–13.
- b. ODENING, K., 1959.—“Über *Plagiorchis*, *Omphalometra* und *Allocreadium* (Trematoda, Digenea).” 19 (1), 14–34.
- c. ODENING, K., 1959.—“Über die Diplodiscidae der einheimischen Frösche (Trematoda, Paramphistomatata).” 19 (1), 54–66.
- d. AHMED, Z., 1959.—“Die Cercarienfauna der Umgebung von Münster (Westf.) und der experimentell ermittelte Individualcyclus von *Echinoparyphium spiniferum* La Valette (Trematoda).” 19 (1), 67–100.
- e. INGLIS, W. G., 1959.—“The systematic position of *Nematoxys piscicola* Linstow, 1907 (Nematoda).” 19 (1), 100.

(76a) Fahmy & Selim examined 220 stray dogs from different localities of Cairo and Giza province during 1956–57 and report on the incidence of trematodes. *Cynodiplostomum azimi* was found in two dogs but experimental infections could not be established by feeding dogs on *Mugil* or *Tilapia*. *Heterophyes dispar* was estimated to occur naturally in 32% of the dogs. Of dogs fed experimentally on *Mugil capito* and *Tilapia nilotica*, 15% harboured *Echinochasmus liliputatus*, 62% *Prohemistomum vivax*, 98% *Heterophyes heterophyes*, 38%

*H. dispar*, 22% *Haplorchis* spp., 15% *Pygidiopsis genata* and 4% *Stictodora sawakinensis*. *Echinochasmus perfoliatus* occurred in one dog fed on *Mugil*, *Phagicola longa* in 60% of dogs fed on *Mugil*, *P. ascolonga* in 50% of dogs fed on *Tilapia*, and—a first record—a few *P. longicollis* in dogs fed on either fish. The morphology of the trematodes is described and compared with earlier descriptions. S.W.

(76b) Odening reports the finding of *Plagiorchis cirratus cirratus* in white mice and restates the definition of the genus. One specimen of *Plagiorchis* sp. resembling *P. cirratus* was recovered from a chicken. *Omphalometra flexuosa* was found in a mole, this being the first time for 150 years that this species has been reported from within the present German frontiers. It is described and illustrated in detail. *Allocreadium carparum* n.sp. occurred in every specimen of 20 *Cyprinus carpio*, seven of which were also infected with *Neoechinorhynchus rutili*. The new species, of which an illustrated description is given, is said to be intermediate between *Allocreadium transversale* and *A. dogieli*. It differs from the former by the position of the seminal receptacle, smaller acetabulum, smaller eggs and longer oesophagus. From *Allocreadium isoporum* it differs also by the position of the seminal receptacle, larger acetabulum and vitellaria extending further anteriorly. The size of the oral sucker is approximately the same as that of *A. dogieli*, *A. isoporum dubium* and *A. markewitschi* but the new species has a larger acetabulum. *A. dogieli* has a smaller pharynx and the vitellaria reach the anterior border of the acetabulum in *A. markewitschi*, which is also the case for *A. angusticolle*. N.J.

(76c) Odening revises various reports on *Diplodiscus subclavatus* from frogs in Central Europe. He concludes that they should concern *D. subclavatus* and *Opisthodiscus nigrivasis* n.comb. and that the latter cannot be considered as a subspecies of *O. diplodiscoides*. *O. nigrivasis* is a frequent parasite of frogs in central Germany and Hungary. The paper carries numerous illustrations. N.J.

(76d) Ahmed examined a total of 2,261 snails in Münster and the surrounding area. The species examined were: *Planorbis corneus*, *Succinia putris*, *S. pfeifferi*, *Spiralina vortex*, *Bithymia tentaculata*, *Viviparus fasciatus*, *P. planorbis* and *Lymnaea stagnalis*. However, only two snail species, *P. corneus* and *L. stagnalis*, were found to be infected with trematodes. The former had a high incidence of infection with a monostome cercaria, *Cercaria spinifera* and *C. gracilis*; whereas a very slight incidence of *C. affinis* occurred in *L. stagnalis*. The monostome cercaria may belong to a new species. *C. affinis* and *C. gracilis* are reported for the first time from Germany. The life-cycle of *C. spinifera* was established experimentally and the adults described as *Echinoparyphium spiniferum*. For this purpose, the eggs obtained from experimentally infected ducks were fed to *P. corneus*, young fish, tadpoles and young *Rana esculenta* and also to various insect larvae. Miracidia were not observed. As a result of this experiment mother and daughter rediae were found in the snails 32 days after infection; cercariae were emitted after eight weeks. Positive results were also obtained with *R. esculenta* tadpoles. Attempts to infect other species failed. Infection of ducks with metacercariae from experimentally infected tadpoles and from naturally infected snails led to the recovery of adult worms in both cases. N.J.

(76e) Inglis reports, after a study of the type specimens from which a lectotype was selected, that *Nematoxys piscicola* Linstow, 1907 is indistinguishable from *Spironoura congolense* Taylor, 1925. As a result the genus *Nematoxynema* Skryabin, Shikhobalova and Mozgovoi, 1951 (*Nematoxys piscicola* type and only species) becomes a synonym of *Spironoura* Leidy, 1856 and *S. congolense* becomes a synonym of *Spironoura piscicola* n.comb. W.G.I.

## 77—Zeitschrift für Tropenmedizin und Parasitologie.

- EL RAGGAL, M., 1959.—“Wird das Geschlecht der Schistosomen durch das der Wirtsschnecke beeinflusst?” 10 (1), 66–70. [English summary p. 69.]
- ROHDE, K., 1959.—“Infektionsversuche mit der Baumwollrattenfilarie *Litomosoides carinii* an weissen Ratten.” 10 (1), 70–78. [English summary p. 77.]

(77a) El Raggal reports on his own experiment concerning Ottolina's theory, according to which the sexual hormones of snails influence sex differentiation in schistosomes. Out of the first group of 25 *Oncomelania* infected with only one miracidium of *Schistosoma japonicum*,



12 male snails produced only male worms, nine of them produced only female worms and four female snails produced only male worms. A similar state of affairs was observed in the second group of 26 snails, which were infected with more than one miracidium, except for the fact that six of the host specimens produced cercariae of both sexes. The sex of the cercariae was determined by infecting white mice.

N.J.

(77b) Since white rats are better laboratory animals than cotton-rats, Rohde reinvestigated the use of white rats as hosts for *Litomosoides carinii* with a view to using them for chemotherapeutic investigations. *Bdellonyssus bacoti* which had previously fed on infected cotton-rats were allowed to feed on 19 white rats; microfilariae appeared in the blood of 17 of the rats 55 to 80 days after infection and, in 12 rats, they continued to be found until the rats were killed 105 to 149 days after infection. The ratio of numbers of males to females in the white rats was 1.5:1, whereas in worms from 32 cotton-rats the ratio was 0.83:1. Mature *L. carinii* were transplanted into the peritoneal cavity of 40 white rats; a small percentage of the worms were still alive two to three weeks later, and microfilariae were found in the blood of six rats. Transplantation was more successful when white rats of 20 gm. to 30 gm. body-weight were used than when rats of 85 gm. to 115 gm. or 195 gm. to 210 gm. were used. Male worms survived the transplantation better than female worms.

W.A.F.W.

## 78—Zentralblatt für Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene. Abteilung 2.

- a. DEUBERT, K. H., 1959.—“Über die Bedeutung der Nematodenfauna ackerbaulich genutzter Böden.” 112 (1/5), 101–108.

(78a) Deubert discusses the effect of cow, horse and stable manure, potato haulms, inorganic fertilizers, pH and nitrogen in soil, on the nematode population. He sampled the population under three-year-old lucerne and spring barley and found that nematodes of the genus *Dorylaimus* were dominant in both environments. *Panagrolaimus rigidus* was numerous in both fields but *Rhabditis monhystera* and *Dorylaimus bastiani* were only found under the lucerne. *Plectus cirratus* predominated in the lucerne, *Tylenchus filiformis*, *Tylenchorhynchus dubius* and *Acrobeles ciliatus* were most numerous in barley.

J.J.H.

## 79—Zoologicheskii Zhurnal.

- a. SPASSKI, A. A., 1959.—[A more precise definition of the types of relative positions of the genitalia in the Hymenolepididae.] 38 (1), 31–37. [In Russian: English summary p. 37.]
- b. NEKHAIEV, V. M., 1959.—[Annual developmental cycle of testes of leeches *Hirudo medicinalis* L. and *Haemopsis sanguisuga* Bergm.] 38 (2), 280–282. [In Russian: English summary p. 282.]
- c. MESHKOV, M. M., 1959.—[Black spot infection of fishes in the Pskov and Peipus Lakes.] 38 (2), 285–286. [In Russian: English summary p. 286.]
- d. BIKHOVSKI, B. E. & NAGIBINA, L. F., 1959.—[On the systematics of the genus *Diplozoon* Nordmann (Monogenoidea).] 38 (3), 362–377. [In Russian: English summary p. 377.]
- e. DUBININA, M. N., 1959.—[*Ligula pavlovskii* n.sp. from *Benthophilus stellatus* (Gobiidae).] 38 (3), 378–384. [In Russian: English summary p. 384.]
- f. KIRYANOVA, E. S., 1959.—[Permeability of the cuticle in fresh-water hairworms (Nematomorpha, Gordioidea).] 38 (4), 509–519. [In Russian: English summary p. 519.]
- g. POLOZHENTSEV, P. A. & ARTYUKOVSKI, A. K., 1959.—[On the systematics of the family Mermithidae Braun, 1883 (Dorylaimata, Enoplida).] 38 (6), 816–828. [In Russian: English summary p. 828.]
- h. MICHAJŁOW, W., 1959.—[Interspecific relationships of two tapeworm species in the intermediate host.] 38 (6), 842–845. [In Russian: English summary p. 845.]
- i. KUZNETSOV, M. I., 1959.—[The role of *Saiga* in the epizootiology of *Moniezia* infection in sheep in the steppes of the Lower Volga region.] 38 (6), 948–950. [In Russian: English summary p. 950.]

(79a) Spasski revises Skryabin & Matevosyan's classification of the types of orientation of genitalia in Hymenolepididae (1942 & 1945); he gives a more precise definition, with illustrations, of each of the 15 types (having eliminated one and added two new types). The examples given of each type include *Wardium arctica* [which is mentioned as a new combination but no reason is given for its transference from *Hymenolepis*] and *Myxolepis collaris* given as

a new combination for *Dicranotaenia collaris*, a species intermediate in character between *Sobolevicanthus* and *Microsomacanthus* and with a characteristic shape of the uterus. It becomes type of *Myxolepis* [stated to be a new genus but without a further diagnosis]. *Lineolepis* n.g., in which two testes lie in a transverse line parallel with the vitelline gland, the third aporal one being anterior to the gland, and the vagina passes anteriorly to the two poral testes, is erected for *L. parva* n.comb. (transferred from *Hymenolepis*) and is said to contain also *H. lineola*. G.I.P.

(79c) Meshkov records for the first time "black spot" caused by *Neascus cuticola* in fish in the lakes Pskov and Peipus (Chud) and notes briefly the occurrence of this disease in Russia. G.I.P.

(79d) Bikhovski & Nagibina, in their discussion of the genus *Diplozoon*, describe *D. pavlovskii*, *D. homoion* and *D. megan*, new species found in the delta of the Volga and the Bay of Finland, and compare the new species with *D. paradoxum*. *D. pavlovskii* from *Aspius aspius* is distinguished by the enlargement of the anterior part of the posterior end of the body; by the narrowing of the median part of the latter; by the greater length of the posterior part of the body relative to *D. paradoxum*; and by the smaller cuticular folds 8-10 in number. *D. homoion*, from *Rutilus rutilus*, is differentiated by the relative shortness of the posterior part of the body and its terminal enlargement; by the smaller median hooks; and by the fact that the clamps have no lateral enlargements. *D. megan*, from *Leuciscus idus*, differs from the two preceding species by the relatively long anterior part of the body; and by the form of the clamps, the median plate of which is very massive with sculptural thickenings. The authors point out the importance of hooks, clamps and digestive tract in the systematics of the genus. N.J.

(79e) Plerocercoids of *Ligula pavlovskii* n.sp., described from *Benthophilus stellatus* from the Danube delta, are typical ligulas in genital structure but differ from other species of this genus in the musculature which is well developed and multi-layered anteriorly, with two longitudinal and two to three transverse layers (as in *Schistocephalus*) over the greater part of the strobila and reduced, in some specimens, to only one muscle set (typical for *Ligula*) posteriorly. G.I.P.

(79f) The cuticle of Gordioidea is composed of four layers, an external protective fibril layer, an areolar layer, a thick supporting layer composed of thin strata of crossing fibrils and an inner fibril layer containing pigment cells. Its permeability was studied on species of *Gordius*, *Parachordodes* and *Gordionus* using portions or entire live worms. Radio-active phosphorus accumulated in the cuticle but did not penetrate to the internal organs and did not enter by the anterior and posterior openings. Vital dyes did pass through the cuticle to the internal organs but the intestinal lumen remained unstained. Thus adult hairworms do not apparently feed through the mouth while entry of soluble nutrients through the cuticle is fully possible. G.I.P.

(79g) Polozhentsev & Artyukovski give keys to genera of Mermithidae and to 65 of the well established species. The rest of the 167 species known in the literature are grouped as insufficiently described. *Tunicamermis* with its only species *T. melolonthae* is made a synonym of *Skrijabinomermis*. *Mesomermis sphaerocephala* is transferred to *Amphidomermis*, *Paramermis fluviatilis* to *Limnomermis*, and *P. transsilvanica*, *L. potamophila*, *L. acroamphidis* and *L. envaginata* to *Gastromermis*. The last three species, however, are grouped as insufficiently described. *Agamermis unka* is considered to be a synonym of *A. decaudata*. An earlier paper by Polozhentsev on the classification of Mermithidae appeared in 1953 in Papers on Helminthology presented to Academician K.I. Skryabin on his 75th Birthday, pp. 532-542. [For abstract see Helm. Abs., 22, No. 996dd.] G.I.P.

(79h) [A fuller account of this work appeared in *Acta parasitologica Polonica*, 1958, 6, 329-354. For abstract see Helm. Abs., 27, No. 180m.]

(79i) Of 16 *Saiga tatarica* shot on sheep pastures in the Stalingrad region, seven were infected with *Moniezia expansa*. The intensity varied from one to seven specimens per animal. Three animals also harboured *Thysaniezia giardi*. The *Saiga* populate highly the steppes of the Lower Volga Territory and are thought to be the reservoir of monieziasis in this region. G.I.P.



## INDEX OF AUTHORS

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